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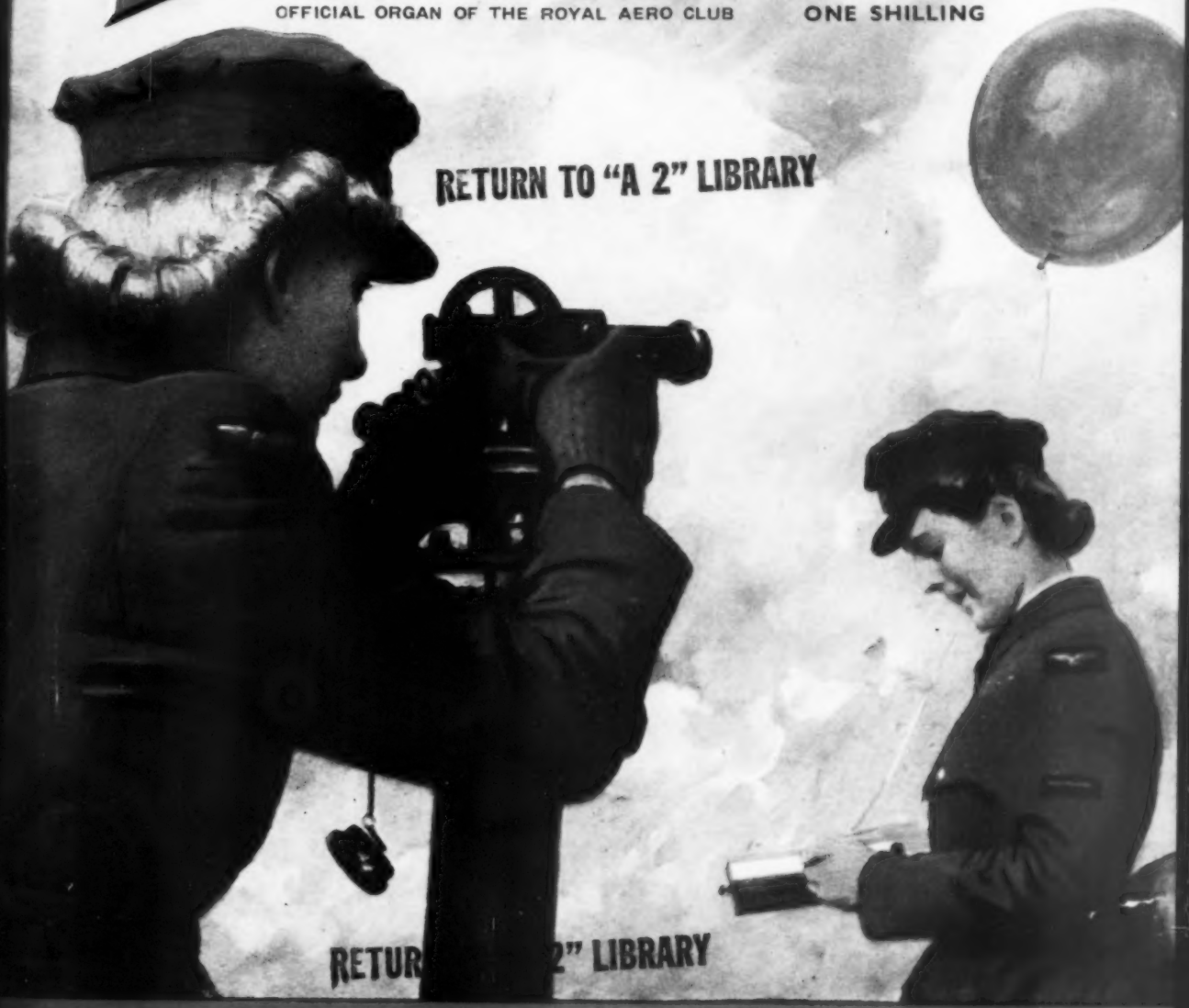

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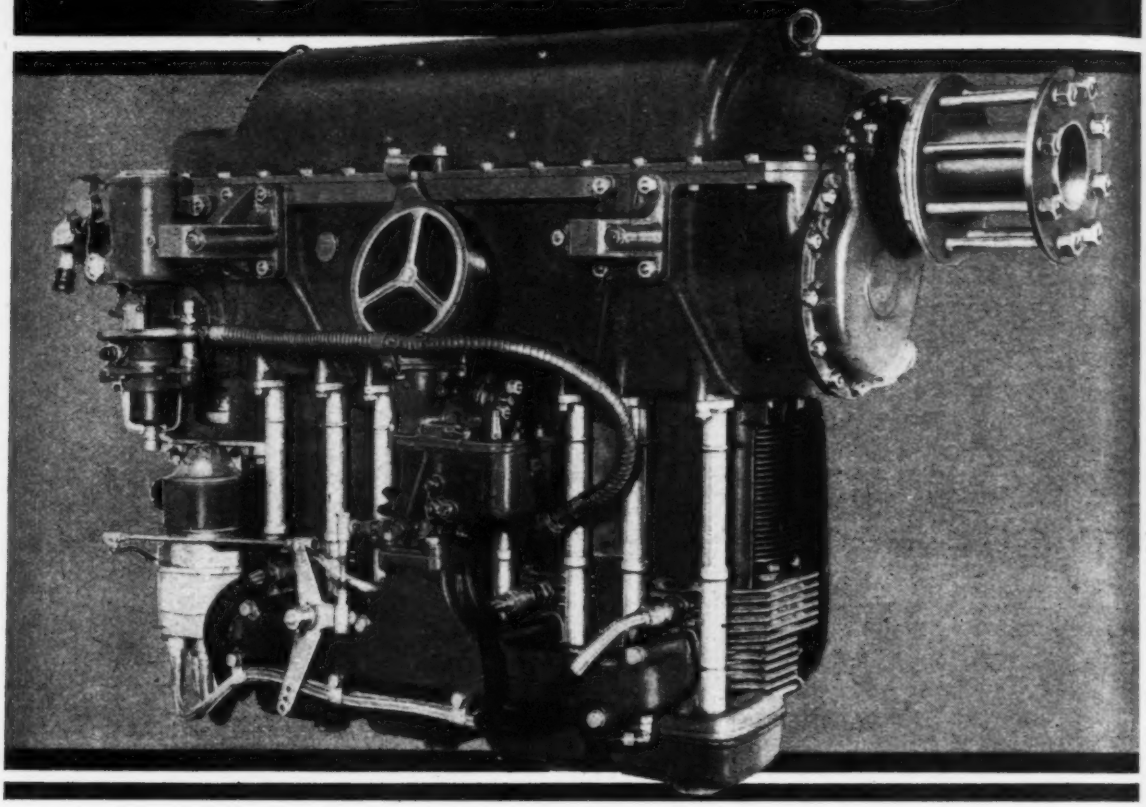

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The Outlook

An Arm or Air Weapon?

FROM an article written by a naval correspondent recently, it is obvious that the Royal Navy is much exercised in its mind because it is unable to turn F.A.A. airmen into sailors. Apparently the ideal arrangement would be to put the Fleet Air Arm on a par with specialist branches such as gunnery or torpedo. Primarily they would be sailors and secondly specialists. There is, however, an unsolvable difficulty caused by the fact that aircrew duty takes a man away from the ship in which he is serving, and absent sailors are, of course, no use to anyone.

This naval correspondent, who may be assumed to be in close touch with official opinion, offers the following somewhat naïve solution to the problem:—

> "If the bulk of naval airmen are necessarily debarred from participation in ship-work, there may be less difficulty about turning the bulk of surface officers into qualified, if not experienced, airmen. To learn to fly does not take very long, and it would undoubtedly strengthen the bonds between F.A.A. and surface Navy and make for more wide-spread naval airmindedness if the average member of the latter could talk the air language with the assurance of a pilot's certificate."

So the ability to fly is to make the higher ranks of the Royal Navy experts in the use of air power! Why not let the F.A.A. airmen learn to sail a dinghy and thus become naval strategists? This would be quite as reasonable, and might be welcomed since it has been affirmed in some quarters for a very long time that in the Navy the shortest way to no promotion above the rank of commander is via the Fleet Air Arm.

Air power, wherever it is used, is a third arm and not merely an extra weapon. Whether air power over the sea is controlled by the Air Ministry or the Admiralty matters little. It must, however, be directed by people who have made a life study of the subject and not by those who are determined to preserve an out-of-date order of things. If a clear definition of the distinction between an air weapon and air power is wanted, it is easily stated. The flying bomb is an example of an air weapon. Bomber, Fighter, and Coastal Commands, and the Tactical Air Forces, wield air power. The Fleet Air Arm should wield air power, but it cannot do so if the directing minds have this "it's easy to learn to fly" and "let's turn them into sailors" mentality.

Telling the World

EFFORT appears to be the significant word in the title of the White Paper on production issued last week. "Statistics Relating to the War Effort of the United Kingdom" is its title, and truly it tells of a stupendous effort by the people of these little islands. It is good that the story should be told, and it is a sign of complete confidence in the ultimate issue that the Government should have decided that it can now be told without damage to our cause. Indeed, the enemy will derive little satisfaction from a perusal of its pages, for they disclose, to those who can interpret the figures, an unstinted giving of their best by every-one concerned, man, woman and child.

During the Battle of Britain Mr. T. P. Wright returned to his native America from a visit to this country, and in writing of his experiences he related a typical incident from a morning after a bomb raid on London: The people crawled out of the still smouldering ruins of their houses, planted a Union Jack on top of the rubble and a placard on which was written: "There will always be an England." Mr. Wright's comment was, "A nation like that cannot be beaten." The enemy must come to much the same conclusion should a copy of the White Paper fall into his hands. A nation which can achieve the almost astronomical figures given in the White Paper,

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and which has no intention whatever of slacking-off until victory is won, is in no need of forced slave labour such as that on which Germany has depended so largely.

The figures relating to the production of aircraft and engines are reproduced elsewhere in this issue. They speak for themselves and, incidentally, reflect the changing policies rendered necessary by the changing war situations. The Battle of Britain called above all for fighters. Lord Beaverbrook got the fighters, but he got them at the expense of bombers. When that danger was over, light and medium bomber production was cut down and production of heavy bombers forged ahead without causing any decrease in fighter production which, in fact, continued to increase at a very satisfactory rate and, by extrapolation, appears to be still growing.

CONTENTS

The Outlook	599
War in the Air	601
Here and There	604
Organising for Efficiency	606
England—Australia	607
U.K. Aircraft Production	608
Fairey Firefly	609
Aircraft in Flying Attitudes	613
The "Gen" Box	614
Civil Aviation	615
A Civil Power Plant	617
R.A.F. Master Bombers	619
Correspondence	620
Service Aviation	622

Back to Bilateralism

UNLESS a miracle happens at the eleventh hour, the Chicago Conference looks very much like being a complete failure. The latest news as we are about to go to press is that the 51 nations represented at the conference are expected to agree on two of the "five freedoms": the right of innocent passage and the right to land for technical reasons or to refuel. It was scarcely necessary to hold the Chicago Conference for an aspect of commercial aviation agreement on which was a foregone conclusion. Without these two "freedoms" there could be no international aviation.

That there are other facets of the complicated subject upon which agreement has been reached is, of course, quite true. But these are mainly the "easy" ones. The really thorny problems have proved too much for the conference or, rather, for the British and American delegates, who have, it seems, done most of the arguing. Canada's valiant efforts to bring about a compromise acceptable to both sides have failed. And so we are to be thrown back upon the system of bilateral agreements which was in force between the wars, and which caused such endless trouble.

Even in the technical field there appears to have been some difficulty at Chicago. For instance, we gather that, to the surprise of everyone, the delegates were presented with a complete new U.S. airworthiness code after the British representatives had declined to accept the existing U.S. airworthiness requirements. The new code must have been drawn up well in advance, and must have taken quite a time. Which only goes to show how well prepared were the Americans for all eventualities. Our people had evidently not expected this, and as a result our representatives had to accept the new code "in principle," but, it is said, with the proviso that an opportunity be given for examining it in detail and offer suggestions for modificatons at the next conference.

The Air Registration Board, to whom the Secretary of State has, under Parliamentary authority, delegated the responsibility for civil airworthiness, is at work on an airworthiness code, but it can scarcely be blamed for not having had it ready in time for Chicago, being very short of staff and receiving no help in the form of release of man-power by the Ministry of Aircraft Production. One would have imagined that Millbank could, by now, well spare the few men needed.

R.A.F. THUNDERBOLTS: On the Burma front the Royal Air Force are using Thunderbolts for air fighting and ground strafing. They carry white identification stripes, and the streamlined drop-tanks appear larger than usual.

WAR in the AIR

Kittyhawks of a New Zealand squadron operating from Guadalcanal in the Solomon Islands.

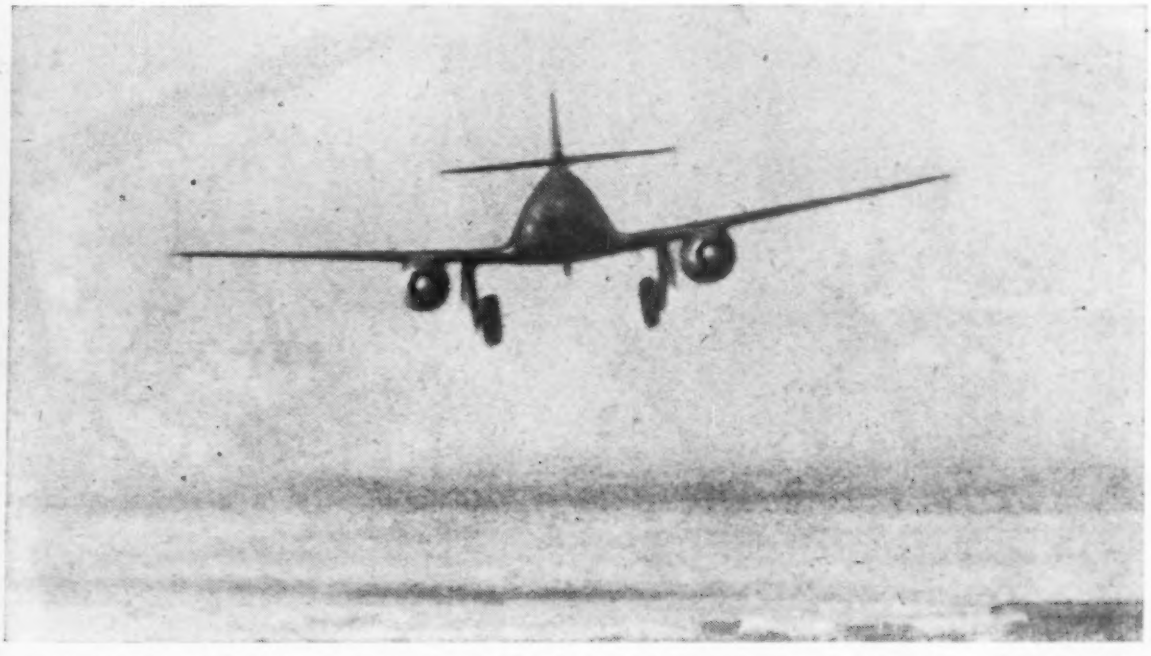
Tactical Aircraft Grounded by Weather : More Raids on Tokyo : Antwerp Port Reopened : Japanese Losses Off Philippines

MODERN warfare has come to a pretty pass when the most successful wing of an advancing army is left in ignorance as to whether its opponents have or have not withdrawn much of their strength across a river to its rear. Yet that was the position of the French and Americans in Alsace in the early part of last week. The weather had made air reconnaissance impossible for some days, and Generals now rely so completely on air reconnaissance that when it fails them they are left in a "fog of war" even denser than when horsed cavalry were entrusted with the task of finding out what the enemy was doing.

Things were no better on the Aachen front, where the U.S. 9th Army had to commence a new attack without the help of any Tactical Air Force. On the front of the U.S. 6th Army Group the U.S. 1st T.A.F. (not to be confused with the British 1st T.A.F. in the Mediterranean) managed to defy the weather to some extent, and informed Gen. Eisenhower's H.Q. that the enemy still had available most of the 28 bridges across the Rhine between Strasbourg and Basle; but that did not mean that all or most of his forces would be able to get across to the east bank. Some commentators are of the opinion that the Germans dare not retreat across the Rhine even if it be in their power to do so, for that would deal the worst possible blow to the *moral* of the German people. The final battle in the West, say these observers, must be fought out between the present front and the great river.

Nevertheless, as the King said in his speech to Parliament, "Both in the east and in the west Germany is invaded."

Thanks to the new inventions, the Allied heavy bombers are not held up by the weather, and in the middle of last week both British and Americans were busy, striking at places not far behind the German lines, whose destruction must seriously hamper the defenders of the Rhine. Fortresses



HE'S HAD IT: An Me 262 jet-propelled fighter, which had run out of fuel, attempts to force-land. This photograph was taken by the recording camera in the U.S. Army 8th A.F. Thunderbolt, which was attacking the Me.

WAR IN THE AIR

and Liberators have attacked the large oil refinery at Misburg, near Hanover, the railway yards at Hamm, and other targets in N.W. Germany. Bomber Command did something novel when it dropped 12,000 lb. blast bombs on Munich, instead of the penetrating type which are usually employed for destruction of targets in cities. Mosquitoes went out in daylight to drop 4,000 lb. bombs on the Duisburg area. These remarkable bombers had not been over Germany in daylight since the spring of last year.

Rain has likewise hampered air operations on the front of the 8th Army in Italy; but a rather mysterious piece of information comes from that front. After a recent advance it was reported that one column of the 8th Army had turned north-eastwards "towards Russia." Austria does not lie far ahead, though the Alps make a barrier in between. We must wait and see what developments, if any, result from such a move.

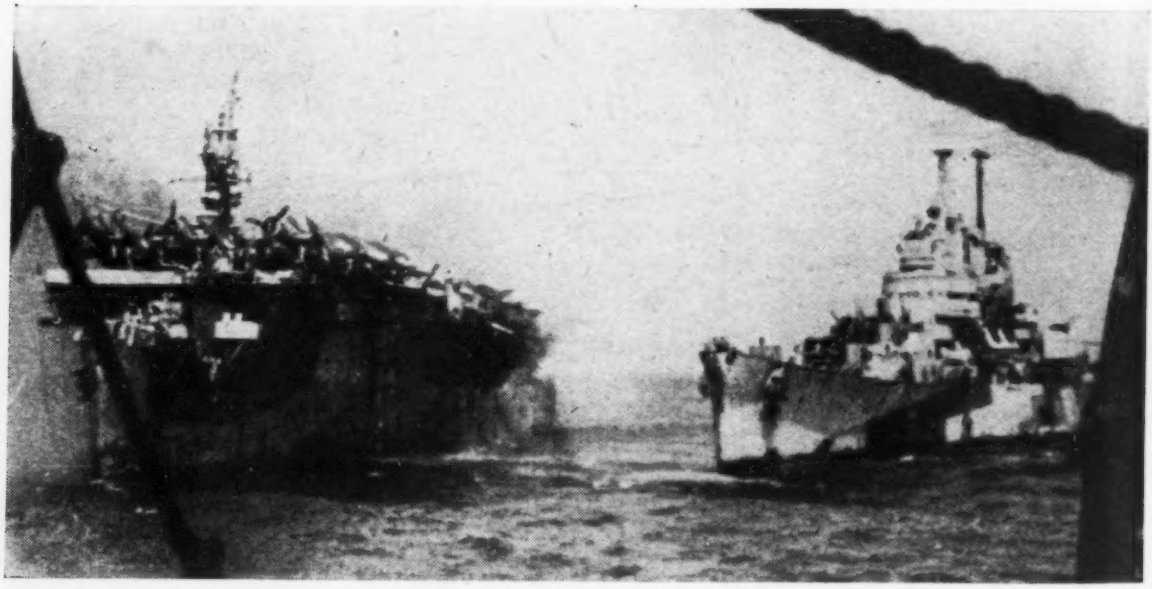
The Dortmund-Ems Canal has been breached a third time by Bomber Command It is said that repairs will be even more difficult this time, though the Germans have been seen already setting about the work. They do value that canal, and the persistence with which they keep on repairing it is a testimony to the havoc which our aircraft have created on the German railway systems and likewise on the coastal shipping.

Despite the practical grounding for days of the various Tactical Air Forces on the Western Front, the battle of approach to the Rhine has been going steadily, though slowly, in the favour of the Allies. Whether aircraft are able to fly or not, there is always a great advantage in having the best of the artillery duel; and this the Allies certainly have had up to the present. There has been some anxiety about whether the American factories will keep up the supply of shells for the guns of their armies, but it has been authoritatively stated that the British artillery has and will have ample supplies. Antwerp port has now been reopened to shipping, and that will enormously help the supply problem at the front.

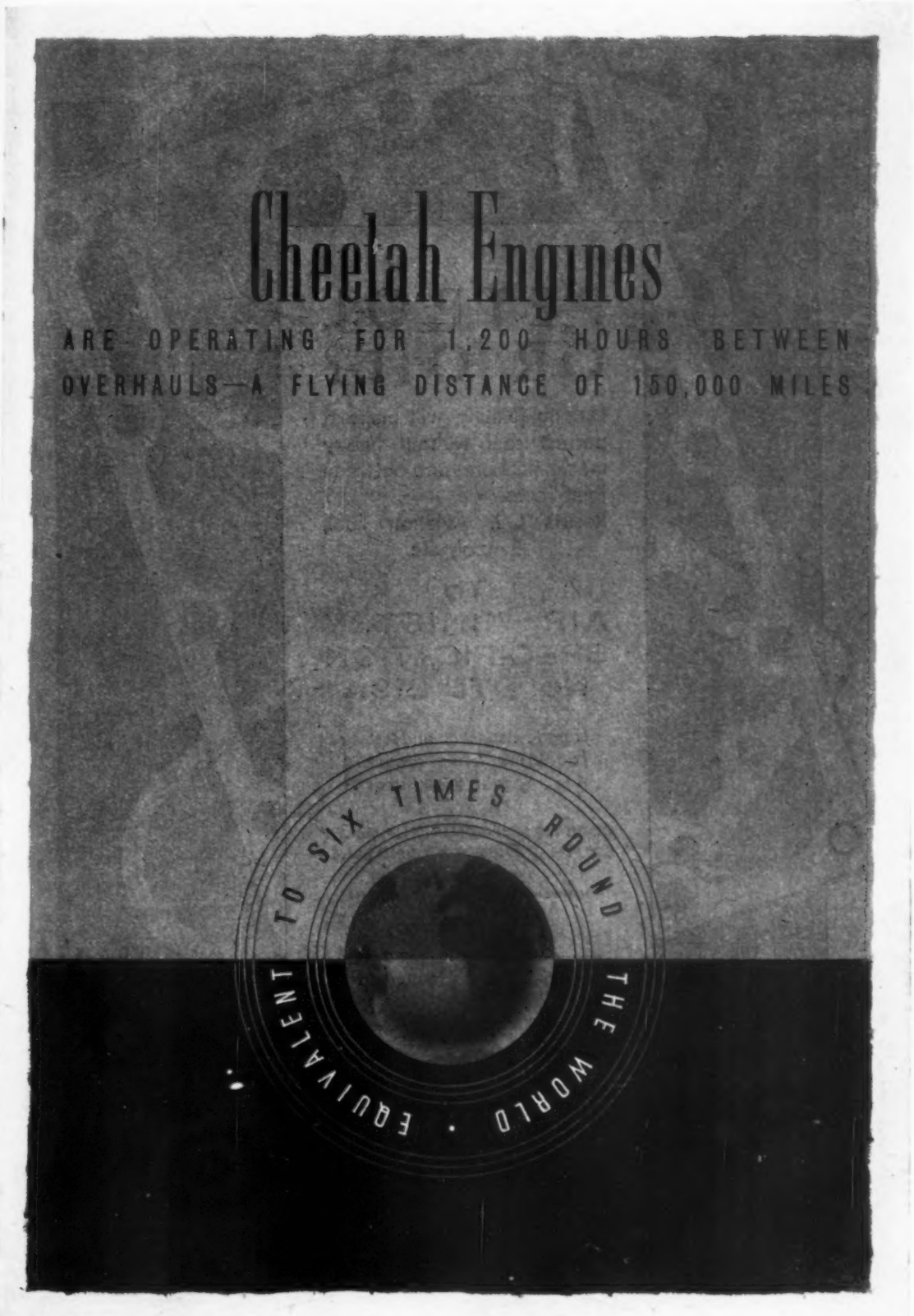
More launching sites for rocket shells have been spotted and strafed by Spitfires. Each operation of that sort will probably save numbers of British lives. It is also reported that increasing numbers of German jet-propelled fighters have been noticed on the Western Front, but they rarely engage in combat. Fighters that do not fight are not much of an asset; but perhaps the pilots are teaching themselves how to get the best out of the new type of machine. *Luftwaffe* personnel have been taken prisoner fighting as infantrymen, not because the *Luftwaffe* is so well off, but because the German Army is in desperate straits for recruits. We British are also diverting into the Army numbers of men who would prefer the Navy or the Air Force; but in our case we certainly have enough men for the Air Force, and have been closing down the Empire Air Training Scheme. The Americans, for their part, send out over 1,000 heavy bombers with hundreds of escort fighters very nearly every day.

There have been more raids on Tokyo by Super-Fortresses from Saipan, and one of them last week was made by night. The Japanese do not like these raids, and one broadcaster has proclaimed that they are a breach of international law and that the men who take part in them are war criminals. This sounds very much like Satan condemning sin. The brutalities which the Japanese have practised on many of their prisoners of war are notorious, and the country has shown no regard at all for the Geneva Convention which its Government signed not very long ago. The

DIE FLEDERMAUS: An Me 163 takes evasive action from an Allied fighter.



LENDING A HAND: A cruiser standing by to help the American aircraft carrier *Princeton* after it had been hit by Japanese bombs in the air/sea battle off the Philippines in October last. The aircraft on the deck had been in action earlier in the day.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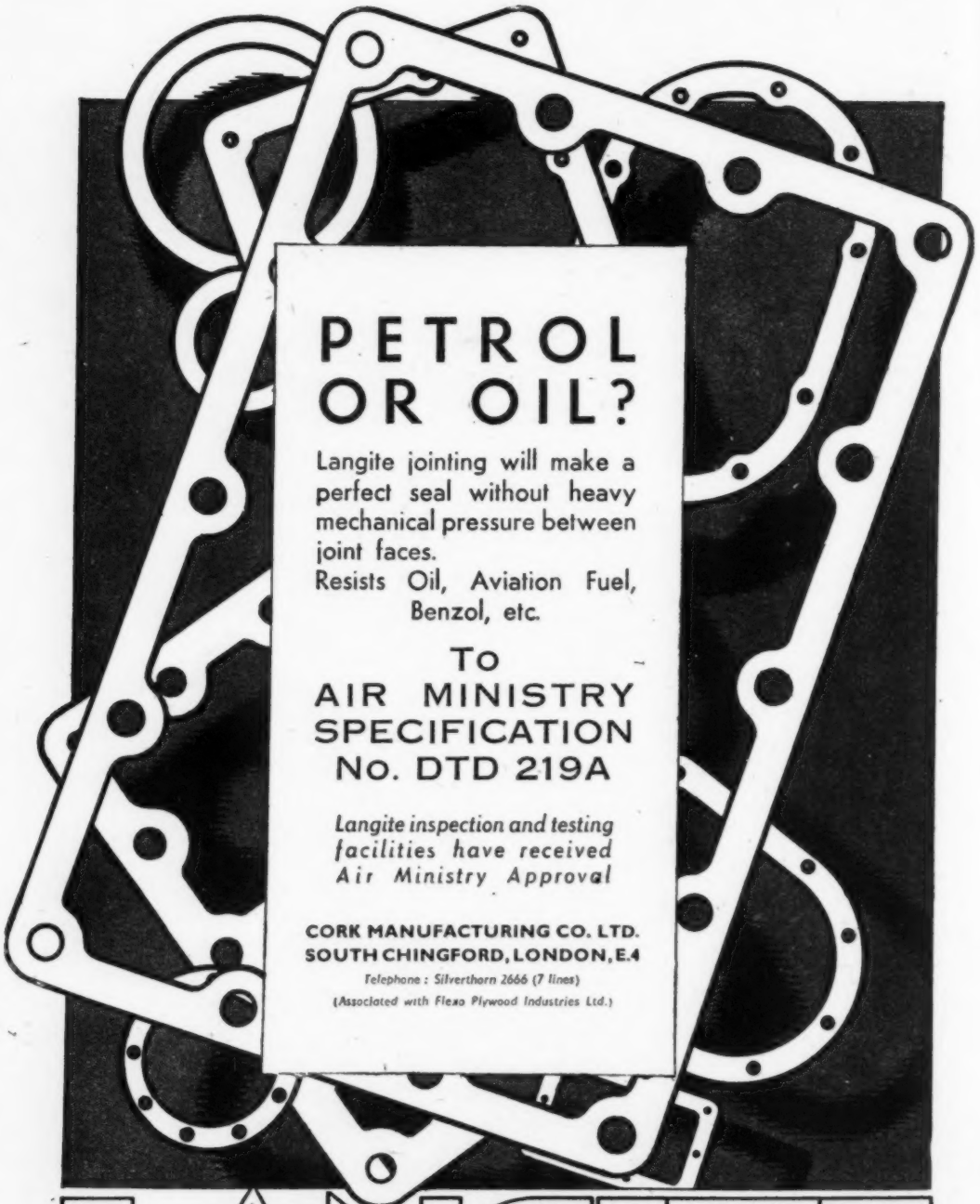

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WAR IN THE AIR

punishment of Japan will go on just the same, and will increase in intensity as the Allies are able to devote more effort to the Far East.

No fewer than seven Japanese attempts to reinforce their troops on Leyte Island in the Philippines have been defeated and destroyed by American aircraft. Transport ships and escorting warships have all alike been sent to the bottom. It is believed that thousands of Japanese soldiers have been drowned in these attempts. It is clear that the Japanese are not able to protect their convoys with fighter aircraft, perhaps because their losses in carriers have been so heavy, but more probably because the American machines and pilots are much better than their own.

Rain

WE are not acquainted with the normal climate of the Philippines, but everybody who knows about the climate in India, either from having been there (and there are many thousands in the United Kingdom who have had that experience) or by hearing about it from friends, knows that the months of November and December there are about as near ideal as one could wish for in this imperfect world. One imagines that the same is true of most of the East. However, the rain which has had such a hampering effect on the movements of the Allies in the West has also bothered Gen. MacArthur's men in Leyte. There has been a typhoon (not with a capital T), and the mud there is, we read, very bad. There has in consequence been little movement on the ground last week, and little flying too. Still, supplies have had to be dropped from the air to the troops in remote spots.

Among the American responsibilities in Leyte is the need of providing food and clothing for the Filipinos, who have been suffering under Japanese tyranny, and have a right to expect all possible help from their American friends now that they have returned. Relief ships have been arriving in the island from the United States with supplies of food and clothing.

Burma, at least, ought to be enjoying the finest of fine weather by now, and there the forces of Admiral Mountbatten have been pushing on in a satisfactory manner; while the aircraft have been flying freely, and attacking Japanese strong points, as well as harassing communications by rail and river. In a country with such sparse communications, it must be very difficult at the best of times for the Japanese to maintain their supplies; but when all the routes are all subject to constant air attack it is a marvel that the soldiers in the front line get any ammunition at all. Perhaps a good deal is transported on the backs of coolies who move by jungle paths which are hidden from the eyes in the air.

December actually showed up better in its first few days than most of November had done on the Western Front. Last week-end the medium bombers of the U.S. 9th Air Force dropped more than 350 tons of bombs in the Saarlauten area, in assistance to the brilliant advance of the American 95th Division, which crossed the troublesome river Saar there and captured the main bridge intact. Fighter-bombers were also active against ground targets, and Mustangs which were strafing the Germans from 4,000ft. caught sight of some 20 Me 109s above them. The latter watched the proceedings for a while, and then flew away. Evidently they had orders to live to fight another day. The front of the 3rd Army in Germany was 40 miles long at the week-end.

MONOWHEEL: An Avenger of the U.S. Navy landing-on with only one leg down. The arrester-gear prevented a crash over the side.

Heavy Bombing

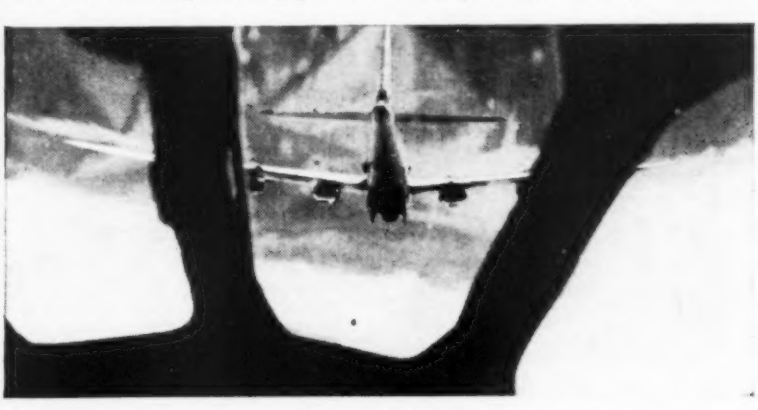
BOMBER COMMAND'S Lancasters were also busy, mainly disrupting railway yards which serve the German front, and also bombing through thick cloud a benzol plant on the outskirts of Dortmund. With the recent destruction of petrol and oil plants, benzol has acquired an unusual importance to the German war machine.

Despite the bad weather of November, Bomber Command set up a new record during the month by dropping 53,000 tons of bombs on Germany. The crews did not have a comfortable time. At high levels winds of more than 100 m.p.h. were endured on 18 days, and on two of them the wind velocity went up to over 200 m.p.h.

In addition to the weighty efforts of Bomber Command, the 2nd Tactical Air Force dropped 3,356 tons. Its aircraft discharged 11,000 bombs of various calibres, and fired 14,000 rockets. The U.S. aircraft dropped 50,630 tons.

The U.S. 8th Air Force is a Command which includes fighters as well as bombers. This arrangement is necessary for a force which operates by day. During the past month it sent out more than 13,600 fighters either on escort duties or on attack missions. They claim to have shot down 464 enemy aircraft and to have destroyed an additional 136 on the ground.

During the month R.A.F. Fighter Command made 30 attacks on V2 targets in Holland.



THROUGH THE LOOKING GLASS: A B-29 Superfortress as seen from another in line astern while a formation of them wing their way to Formosa.

HERE AND THERE

R.Ae.C. Committee

AIR COMDRE. H. M. PROBYN, C.B., C.B.E., D.S.O., has been electled to fill a vacancy on the committee of the Royal Aero Club.

W.A.A.F. in India

THE first contingent of 500 W.A.A.F. officers and other ranks arrived recently at Bombay. They are to replace officers and men of the R.A.F. in certain duties in India and Ceylon.

Plessey's New Chairman

MR. A. G. CLARK has been elected chairman of the Plessey Co., Ltd., in succession to the late Mr. Henry Morgan. The firm's secretary, Mr. J. A. Smith, has joined the board of directors but continues to act as secretary.

Alvis Announcement

THE directors of Alvis, Ltd., announce that Mr. T. G. John has relinquished his post as managing director and left the boards of Alvis, Ltd., and Alvis Mechanisation, Ltd. Mr. A. E. Nicholson has been appointed chairman.

Squirted

THE first Me 262 to be brought down by the A.A. gunners of the R.A.F. Regiment was reported last week to have crashed near Helmund and burned up on the ground not far from the battery position. Three direct hits were observed on the aircraft.

Long-distance Flyer Retires

GRP. CAPT. (Temp. Air Comdre.) O. R. GAYFORD, who took part in many pre-war long-distance flights—he received the A.F.C. in 1933 for his part in the non-stop flight from Cranwell to South Africa (Walvis Bay)—has retired from the R.A.F., retaining the rank of Air. Cmdre. stated *The London Gazette*.

With Pride

JANE AUSTEN'S "Pride and Prejudice" was recently performed for a week by the Dowty Players, all of whom are employees of Dowty Equipment, Ltd. The Cheltenham General Hospital benefited to the extent of £240 by this effort, which seems to be putting prejudice to an excellent cause.

Lucky Schoolboys!

GLIDING instruction on a large scale for Britain's schoolboys was foreshadowed by A.V-M. F. P. Don, speaking at a Nottingham school last week.

A.V-M. Don, who is a regional air liaison officer, urged the boys to seek adventure in contrast to everyday working life, and said: "The Air Ministry is determined to make gliding instruction possible for as many boys as they can."

From a New Angle

EXPERIMENTS in fitting the Fairchild machine-gun camera in a small blister at the apex of the Mustang's fin, now being tried by the U.S.A.A.F., may result in this new position becoming general practice on all fighters.

There are several advantages over the conventional positions in the wing or nose—less vibration giving sharper pictures, the camera is clear of dust and "prop. wash," it is more accessible, and the dramatic value of combat films taken is enhanced by showing the pilot and most of the aircraft in action, as well as his target.

The idea is not really new, for Hawkers made use of it several years before the war when collaborating in the making of some flying sequences in a "movie."

DROPPING A LINE with new U-type harness attached during an air/sea rescue demonstration by U.S. Coastguard helicopter.

Two-hundred Up!

A BASE defence group of the 2nd T.A.F. recently destroyed its 200th German aircraft in night fighting since D-Day. The double century was rung up when a Canadian Mosquito crew bagged a brace of Ju 88s.

Faster and Faster

THE Atlantic record (unofficial) was lowered again last week by a Mosquito of R.A.F. Transport Command, which made the flight from Goose Bay to a terminal in the north of Britain in 6 hr. 8 min. The distance is 2,230 miles, so the average speed was 363.58 m.p.h.

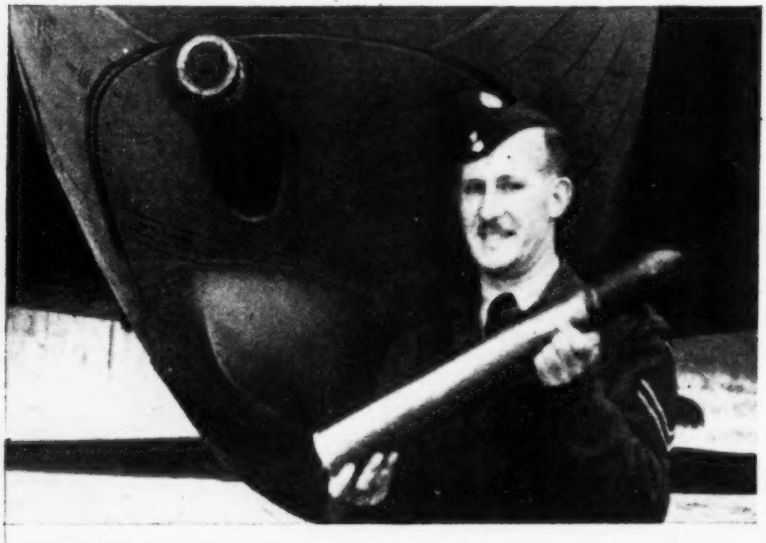
"Our indicated airspeed was 250 m.p.h., and the true airspeed 290 m.p.h.," said the pilot, Capt. Maurice Gill, who added that a following wind gave them the other 70-odd m.p.h. The navigator was Mr. Jean P. Lagodec, of Montreal.

They took off at 10 a.m. and landed at 4.8 p.m., having flown across above the clouds in bright sunshine.

"Jet" Airliners Coming

JET-PROPELLED commercial aircraft within two or three years were prophesied by Mr. A. Shaw MacLaren, civil engineer of B.O.A.C., when he addressed the Institution of Civil Engineers in London last week.

Referring to the size of future types, he quoted "the largest British transport aircraft" at present being designed as having a wing span of 230ft., tail-span of 75ft., overall length of 170ft., and an overall height of 47ft. 4in. This presumably referred to the Bristol Braba-



PENETRATING ARGUMENT: The six-pounder shell fired by the Mosquito XVIII developed for dealing with U-boats. The cannon is a 57 mm. weapon, not 75 mm. as stated by one of our contemporaries.

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The sale of prints of Frank Wootton's paintings has already been responsible for raising over £3,500 for the Royal Air Force Benevolent Fund.

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Name and Address (Block letters, please)

Haven't we met before?

"That's right, Sir! I serviced your machine at Lagos last February!"

The aim of Field Aircraft Service is easy to state—*world-wide service.* Not so easy to achieve of course, but we shall get there. In the post-war years, when airlines spread and extend to every corner of the globe (do globes have corners?) certainty of service will be just as important as speed, or comfort. More important we think; for proper servicing on the ground means security in the air. And on security, above all, progress in air transport will depend.

FIELD AIRCRAFT SERVICE

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HERE AND THERE

zon I, which, it has been suggested elsewhere, may be jet-propelled.

"Independently prepared British estimates of the largest commercial aircraft expected to be built within the next 10 or 20 years," said Mr. MacLaren, "gave figures of 360,000 lb. and 400,000 lb. operating weight with a 300ft. span.

Helicopters, he thought, might come into use soon for air-taxis and private owners, but did not seem likely to oust winged aircraft, at present, from the medium- and long-distance fields of transport.

Spain's Largest Airport

THE largest and most modern Spanish airport has been built at Gando, on Gran Canaria, one of the Canary Islands, the German Overseas News Agency reported, says Reuter.

"The airport has two landing grounds, one 1,640 yards by 955 yards, and the other 1,774 by 955 yards, and has facilities for flying boats."

Eyes on the Future

ABOUT 12,000 new recruits, mostly youngsters from 15½ to 16 years of age, have joined the A.T.C. in the three months up to October last.

Nearly all of them, it is reported, are thinking chiefly of Britain's post-war air developments as they have been told that the Corps will form the main source of personnel supply for civil as well as military aviation.

With R.A.F. Compliments

LT. GEN. JAMES H. DOOLITTLE, commanding the U.S. Eighth Air Force, received from Air Vice-Marshal J. B. Cole-Hamilton, Air Officer Commanding a fighter group of the R.A.F., congratulations on the American airmen's "Truly magnificent achievements" in destroying 236 German aircraft in two days.

Out for a Million

THE R.A.F. Association, whose aims and objects were outlined in *Flight* of November 16th, is making a big drive to increase its membership and the number of its branches in order to extend the help it can give to members and ex-members of the Force—its chief *raison d'être*.

"We are looking forward," said the chairman of the executive committee, Air Comdre. Howard Williams, "to a million members and a branch in every village in the British Commonwealth."

Tails Up!

THE famous Liberator, *Commando* (more prosaically AL-504) has now logged more than 400,000 miles on special flights, and recently inaugurated an 11,520 miles ferry service from Montreal to Sidney, thus linking Canada with the Antipodes.

It is unique among Liberators in that the standard twin tail unit has been replaced by what is reported to be the largest single fin and rudder of any aircraft in operation: its apex stands 31ft. high when the *Commando* is on the ground. The tricycle undercarriage helps, of course.

Manchester's Part

AN assurance that Manchester will be included from the start in Railway Air Services' post-war network operating in Britain and to the Continent was given to representatives of the Manchester Airport Committee by Mr. W. P. Bradbury, Commercial Manager of Railway Air Services, last week.

It was obvious, he said, that Manchester must have a prominent place in the scheme and would become more and more important as the services developed.

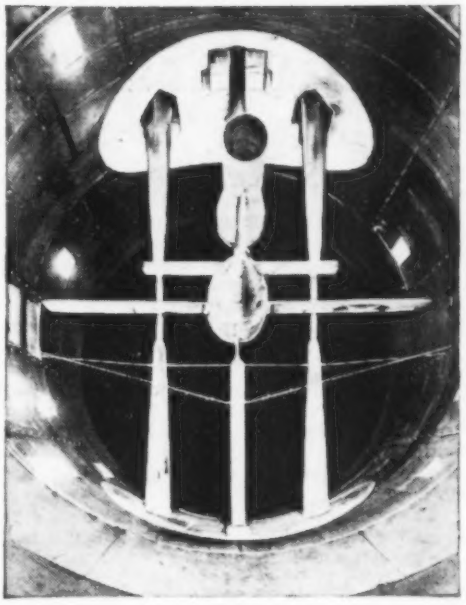
Australian Aircraft

SENATOR DONALD CAMERON, Australian Minister of Aircraft Production, in a statement on a post-war policy for aircraft production, called last week for an industrial organisation capable of producing aircraft of the most modern types.

To assure a virile Air Force for Australia, he said, it must be capable of rapid expansion in the event of a threat of hostilities.

He declared that the three types of aircraft essential for an effective Air Force to-day were the single-engined, single-seater fighter, the twin-engined fighter intruder, and the heavy bomber.

Australian workshops which are at present developing the production of Mustangs, Mosquitos and Lancasters, could be regarded as permanent organisations for the types needed for the future.



YANKEE DOODLE: A U.S. version of the German V.1 undergoing wind-tunnel tests by Air Technical Service Command at Wright Field, Ohio.

And Still Going Strong

CAPT. W. L. STEWART, a B.O.A.C. senior captain, recently completed his 100th crossing of the Atlantic when he touched-down at Prestwick.

New U.S. Airports

"MR. JESSE JONES, Secretary for Commerce, under the auspices of the Civil Aeronautics Administration, has submitted a plan to Congress recommending the construction of more than 3,000 new airports and the improvement of more than 1,600 existing airfields in the U.S.," says Reuter.

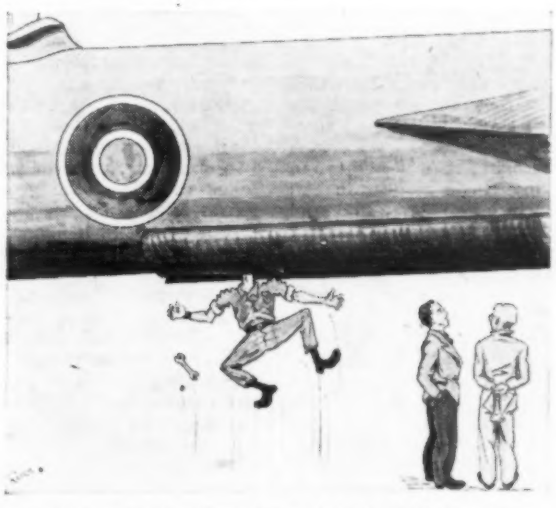
The programme is estimated to cost more than $1,250,000,000 (about £312,500,000) and will require from five to ten years to complete.

Although emphasising that the airfields "are for personal flying," the report stresses the necessity for the construction of an additional 31 large airfields equipped to accommodate long-range international and domestic operations. This would bring the total of such airdromes to 336.

The report anticipates that the 25,000 civilian aircraft flying to-day will be increased within the next ten years to nearly 400,000.

The War Department announced at the same time that domestic air lines will soon receive "a substantial number" of desirable types of aircraft, which have been declared surplus to war needs, in order to increase the present inadequate wartime fleets and replace the worn-out aircraft.

The word "airstrips" instead of "airports" would probably give a more accurate idea of the 3,000.



"I've never seen bomb-doors stick like this before!"

"Indicator" Discusses Topics of the Day

Organising for Efficiency

The Necessity for New Ideas in Airline Operation : Suiting the System to the Circumstances : Central Bases Essential

WHATEVER the future of air transport may be—whether it will be a "natural" means of travel for the ordinary person; whether it will be reserved for priority passengers and those who will be able to pay the very considerable fares necessary for economic unsubsidised operation; or whether it will always be a heavily subsidised, virtually State-owned and State-managed convenience—it must inevitably be run by people who have forgotten all they have ever known of the operation of any other transport systems. Unless there is a very considerable change in the layout of aircraft, and unless an entirely different conception appears and is allowed to develop, all normal ideas of transport operation will need to be scrapped.

The present-day aircraft is very much a piecemeal affair, from the technical point of view, in which no single part works in more than artificial collusion with any other part. It is, in fact, a hotch-potch of mechanical contrivances, no single one of which has any real connection, in heredity or parallel development, with any other. Whereas the locomotive may reasonably be built in one place and by the same group of people, and the ocean-going liner by one or two groups of people, the aircraft is the product of dozens of groups, each entirely segregated from the others. In the ultimate result, the designer (if there can be such a person) is dependent on the work of hundreds of other designers, each of whom may have his pet ideas in his particular line of engineering development.

The aerodynamic expert may have the most astoundingly good schemes, but he is dependent on so many other considerations that the final result may be very much a compromise. The engine designer, interested in making a power unit which will produce the most urge for the lowest weight and the least expenditure of fuel, is harassed by considerations of bulk, and space, and cooling—and may even be beaten in the end by simple electrical or metallurgical problems which cannot be solved by the experts concerned. Through the whole business of designing an aircraft the electrical, hydraulical and mechanical experts are struggling to fit their ideas in with the design as a whole, while the "designer" of this "whole" is trying to fit his ideas to the material available.

Combined Operations

Unfortunately it doesn't end just there. The very fact that the whole contraption is a combined effort makes it just as much of a combined effort for the maintenance crews. No single tradesmen (as they are known in the R.A.F.) can successfully cope with all the different complications, and a separate tradesman is necessary for each section of the machine. Furthermore, it is necessary, in the interests of safety, that any single tradesman can "snag" the particular detail in which he is interested, and ground the aircraft until he has mended the part, or obtained a duly certified replacement. Whereas the ocean liner, or battleship, or even locomotive, can continue its journey while waiting for a comparatively unimportant part, the aircraft must stay on the ground.

Very little work is possible on an aircraft while it is actually airborne. Perhaps when we reach the stage of hundred-tonner all-wing aircraft it will be possible, reasonable, and quite safe for work of a major maintenance character to be done while the aircraft is in the air, but that time is not yet. A sea-going liner can continue on its way while the passengers are happily unaware of a short-circuit fire which is being fought—and quite safely at that—in the bowels of the ship, but anything which involves the risk of catastrophic failure must ground an aircraft.

We can take it for granted, therefore, that aircraft are necessarily going to be a good deal less reliable than any other means of transport for many years to come—but that, with suitable organisation, does not mean that the *services* being run need to be less reliable within the tolerances imposed by weather conditions and any devices produced to cope with the effects of these conditions. All we need is a new angle on transportation arrangements. At the moment it would appear that the Americans have seen the need for this new angle and have organised for it, while we are still thinking in terms of sea-going ships and trying to make each aircraft more or less self-supporting on its journey, with a resident flight engineer and very little in the way of maintenance arrangements at the intermediate stopping points. In their present stage of development, at least, aircraft cannot be self-supporting and are dependent on a massive and well-thought-out ground organisation to keep them in the air.

Cost of Organisation

This organisation is expensive, and will be still more expensive in the years to come. Among all the other capitalised concerns, air transport will require a bigger initial outlay than any other, but the bigger the outlay the greater will be the expectation of return in due course. Airline organisation must be gigantic in conception, or nothing at all. It is not a thing that can be fiddled with, thinking in terms of a few million pounds sterling. The millions must be multiplied by hundreds and the shareholders must expect to wait years for a return—but when it comes the return will be more than adequate.

It seems obvious to me that the principal base of any airline organisation must be approximately midway along the main route, so that all outlying terminals are more or less equidistant from this base. If our own airlines are to continue to develop generally towards the Middle and Far East, then it is obviously useless to have a centre of organisation and maintenance in this country; it must be laid out in Egypt or India, with services radiating from this centre, which must not be a terminal so much as a "hub." If conditions demand, then there might be two "hubs" or more, but each must be the centre of a radiation of lines, and not the end of one of the "spokes," however commercially or politically important the terminal may be. Technicians, spare parts, spare engines, and whole aircraft must be kept in readiness at this base, and it is obviously silly if these must be flown from one end of an airline to the other when necessary. There were one or two occasions in peacetime when our own national airline failed to deliver the goods in reasonable time because spares or new aircraft had to be flown such considerable distances. Even if financial and other considerations prevented the organisation of "caches" along the whole route to deal with such contingencies, at least a more central base would have considerably reduced the delays.

In fact, of course, the position of and equipment state at the base are only second in importance to the institution of these "caches" along all routes. Remembering the technical weakness of present-day aircraft, it is obvious that we must return to stage-coach ideas in our planning system. The limit of continuous travel in the old days was the strength and endurance of the horse. The long-period stops were arranged not for the benefit of the passengers, but on a basis of equine efficieney and comfort. The various temperamental parts of the present-day air-

craft demand constant inspection and attention and replacement for efficient work in just the same way as the horses of the stage-coach days.

So we must have "staging posts" equipped, not with horses, but with all the items which now take the place of the horse and with experienced personnel capable of servicing these items and replacing them at short notice. At the more important "stages" there will be whole aircraft which can be taken along by the same crew without delay and with the least possible inconvenience to the passengers. At the intermediate "stages" there will be complete engines (or power eggs), undercarriages, hydraulic pumps, tyres, instruments, and any items which experience of operation has shown to be liable to failure at short notice. And with them will be a competent staff of technicians, with all the necessary devices for major replacements at short notice—workshops, cranes, jacks, and all the rest of it. The airliner of the future will certainly be able to get along with one of its engines stopped and airscrew feathered; at reduced speed and with inferior cooling, with one or both of the undercarriage legs dropping; or with the automatic pilot unserviceable—but, once landed at the next stopping point, it will not be expected to proceed in the same condition, and passengers cannot be expected to wait.

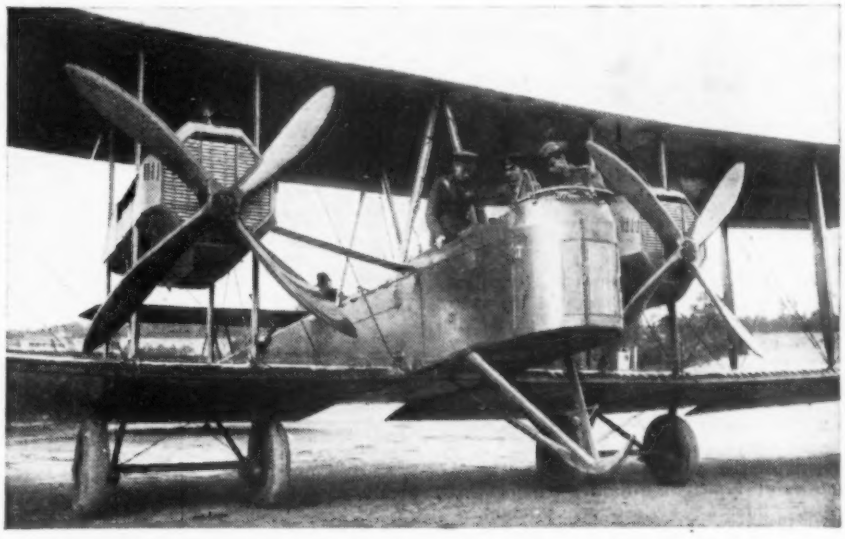
Finally, it is no use imagining that it will be possible to "build up" such an organisation gradually. During the building-up process hundreds of passengers will be disappointed and hundreds more will be discouraged by hearsay; by the time the airline is in full and excellent working order its name will be mud. The complete organisation, at whatever cost, must be there before the passengers are even asked to travel. The cost, for a major airline company, will be about the same as that for a week of modern war. And much more profitable.

"INDICATOR."

England - Australia

Silver Jubilee of the Vickers Vimy's 28-day Flight in 1919

TWENTY-FIVE years ago, on December 10th, the Vickers Vimy-Rolls flown by Capt. Ross Smith and his brother, Lt. Keith Macpherson Smith, landed at Port Darwin, Australia, and thus won the £10,000 prize offered by the Australian Government for the first flight from England to Australia within a time limit of 720 hours—that is, one calendar month of 30 days.



FIRST TO AUSTRALIA: The Vickers Vimy (350 h.p. Rolls-Royce Eagle VIII engines) before starting on its journey. In the nose is Sgt. W. H. Shiers, A.F.M. Capt. Ross Smith, M.C., D.F.C., A.F.C., and Lt. Keith Smith are in the pilot's cockpit and Sgt. J. M. Bennett, M.S.M., A.F.M., is in the fuselage cockpit.

Having left Hounslow on the morning of November 12th, the Smith brothers covered the 11,294 miles in slightly over 28 days, and so were comfortably inside the time limit. *Flight* recorded their safe arrival at Port Darwin in its issue of December 11th, and a fortnight later was also able to record that the King had bestowed knighthoods on the two flyers. Sgts. W. H. Shiers and J. M. Bennett, who formed the other half of the crew, received bars to the A.F.M.s they already held.

Perusal of Ross Smith's diary, published in *Flight* of December 18th, together with a map showing the various "hops" across Europe, the Middle East, India, Burma, the Malay Peninsula, and the Dutch East Indies, remind us that such a flight was a physically arduous affair in those days, even if the aircraft behaved itself well, as did the Vickers Vimy. Contrast the luxury of heated and air-conditioned cabins and white-coated stewards serving a dainty dinner in the modern airliner with this entry, for example, made on the first day over France: ". . . Intense cold, 75 degrees frost; instruments frozen; machine covered with ice; food too frozen to eat. . . . Very relieved to see Lyons." Or this: "Nov. 17.—Left Taranto 8 to-day, arrived Suda Bay 3.45. Strong wind on our beam, low clouds, rain all the way to South Greece. Attempted to get above clouds, but too high, so flew at 800ft. Following coast nearly hit small island in mist. . . ."

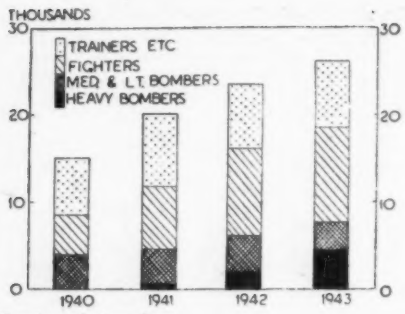
Yes, flying was flying in those days, but it should be mentioned that the diary did speak of fine weather and plain sailing on other sections. It also contained repeated references to the good behaviour of their aircraft.

One exciting take off was also recorded. This was from the airfield at Pisa, which they found under water, and they got bogged trying to restart. After several attempts to un-gum the 3-ton Vimy, using planks and Italians, they managed to get going. "Start sensational," says the diary at this point, "Sgt. Bennett held tail down until machine working, then made running jump at rear cockpit, hauled aboard by Shiers as machine was leaving ground. Aerodrome two inches under water but Vimy rose beautifully. Crew very wet but cheerful——"

Taking off from Calcutta's rather small racecourse airfield also had its anxious moments, for just as they were leaving the ground their machine struck two of the many hawks circling around low down. One hit the airscrew and the Vimy narrowly missed some trees in avoiding more of the birds. "No damage to the propeller, but pieces of hawk were hanging on the machine the whole journey," adds this entry for November 29th.

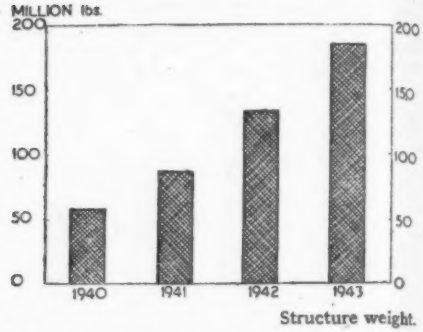
Altogether 1919 was a great year for Vickers-Armstrongs and the war-designed Vimy. Within its span they pulled off a grand "double," first the transatlantic flight by Alcock and Brown, and then this first of all England-Australia flights. A Silver Jubilee to be proud of to-day.

RETURN TO "A 2" LIBRARY



Number of aircraft.

U.K. Aircraft Production



Structure weight.

Industry's Amazing Achievement : Number of Aircraft Trebled, Structure Weight Increased Six Times and Engine Output Five Times

STRIKING statistics concerning the increase in output of aircraft and engines by the British aircraft industry from the outbreak of war to the end of June, 1944, are contained in the White Paper (Cmd. 6564) issued last week :—

At the beginning of the war, total deliveries of new aircraft were at the rate of 730 a month, and over a quarter of these were trainers. By 1943 the average rate of deliveries had trebled and as measured by structure-weight had increased nearly six-fold. The fact that structure-weight increased more rapidly than the number of aircraft was the result of the change to larger and more powerful types of aircraft, particularly heavy bombers. 2,889 heavy bombers were delivered in the first six months of 1944, compared with only 41 in the whole of 1940. The output of fighters also showed a striking increase—from 110 a month in 1939 to 940 a month in the first half of 1944.

UNITED KINGDOM DELIVERIES OF AIRCRAFT, AIRCRAFT ENGINES AND BOMBS.

	1939 Sept. to Dec.	1940	1941	1942	1943	1944 Jan. to June	Total Sept. 1939 to June, 1944
Heavy bombers	—	41	498	1,976	4,614	2,889	10,018
Medium and light bombers	1,072	3,679	4,170	4,277	3,113	1,391	17,702
Fighters	447	4,283	7,063	9,850	10,727	5,655	38,025
Naval	165	476	1,232	1,082	1,720	1,533	6,208
Trainers	772	5,125	6,614	5,940	4,825	2,070	25,346
General reconnaissance, transport, air-sea rescue and other	468	1,445	516	546	1,264	1,071	5,310
Total new aircraft	2,924	15,049	20,093	23,671	26,263	14,609	102,609
Structure-weight of new aircraft delivered (million lbs.)	11.26	58.84	87.26	133.36	185.23	111.75	587.70
Aircraft repaired [1]	—	4,196[2]	12,131	16,636	17,932	9,204	60,099[3]
Aircraft-engines delivered	4,532	24,074	36,551	53,916	57,985	31,643	208,701
Engine horse-power of new engines delivered (million h.p.)	2.90	17.40	31.42	59.45	72.80	41.92	225.89
Aircraft-engines repaired	—	6,726[2]	20,177	27,567	35,832	22,703	113,005[3]
Weight of filled bombs produced (thousand tons)	4.5	48.3	143.4	240.9	308.6	227.8	973.4
Bomb load at 1,000 miles range of average monthly output of bombers (tons)	210	389	736	1,436	2,575	3,221	

[1] Major repairs in the United Kingdom. [2] July to December only. [3] July, 1940, to June, 1944.

The repair of aircraft has absorbed an appreciable proportion of the capacity of the industry. For every six aircraft newly produced in 1943, four aircraft underwent major repairs in the United Kingdom.

Engine Output

Because of the change to larger, multi-engined types of aircraft the expansion in the output of aircraft engines and other aircraft components has had to be even greater than that achieved for airframes. Engine output increased from 1,130 a month at the end of 1939 to an average of 5,270 a month between January and June, 1944. Over the same period the average horse-power was doubled.

Bomb loads increased with the size and power of the bombers produced. In 1939 the average bomb load was 1.2 tons per bomber : in 1943 it was 4.0 tons. The weight of bombs which could be carried a distance of 1,000 miles in one sortie by the monthly output of bombers increased from 210 tons in 1939 to more than 3,000 tons at the beginning of 1944. These figures do not include the bomb-carrying capacity of fighters, which was much developed over the period.

Closely linked with this astounding growth in output is the increase in the numbers of persons working on aircraft. The White Paper points out that the total number employed by the three Supply Departments (Admiralty, Ministry of Supply, and Ministry of Aircraft Production) on orders for the Navy, Army and Air Force reached its highest level in November, 1943, and that since then there has been some reduction in order to build up still further the strength of the Armed Forces for the military operations in 1944. The continued increase up to the beginning of 1944 in employment for the Ministry of Aircraft Production was made possible by a reduction during 1943 in employment on orders for the Ministry of Supply; as the main requirements of Army equipment were fully satisfied, and adequate reserves had been accumulated.

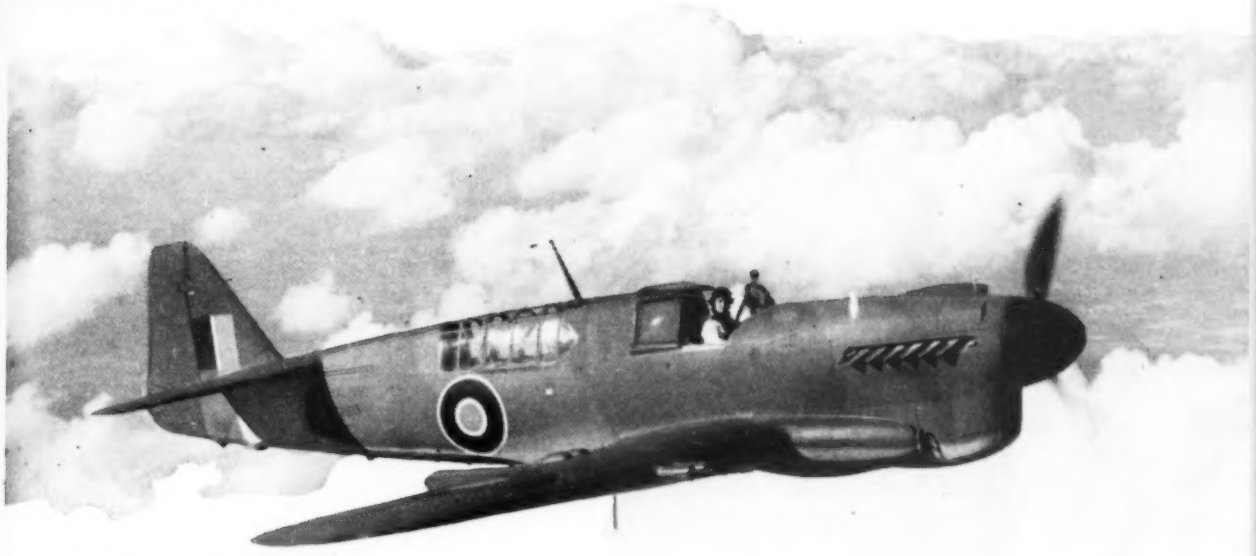
Quoting the figures obtaining at the beginning of the month, the numbers employed on work for the Ministry of Aircraft Production increased as follows: January, 1941, 1,010,000; January, 1942, 1,346,000; January, 1943, 1,623,000; July, 1943, 1,682,000; January, 1944, 1,821,000; July, 1944, 1,731,000.

LONDON AEROPLANE CLUB

REFERENCE to proposals that surplus aircraft, suitable for club and private flying after the war, should be made available throughout the Empire at the lowest possible prices, was made by Major K. M. Beaumont, D.S.O., chairman of the London Aeroplane Club, at their 18th annual general meeting.

This, he said, would be a very wise and important step towards quickly re-establishing clubs and civil schools, and getting them working with good and uniform equipment.

The finances of the London Aeroplane Club, said the chairman, were adequate for the re-opening of the club on a sound footing. They were well placed in the matter of facilities and though it was not yet possible to announce detail plans, they should be able to resume activities at the earliest possible date and on lines suited to post-war conditions.



A Review of the

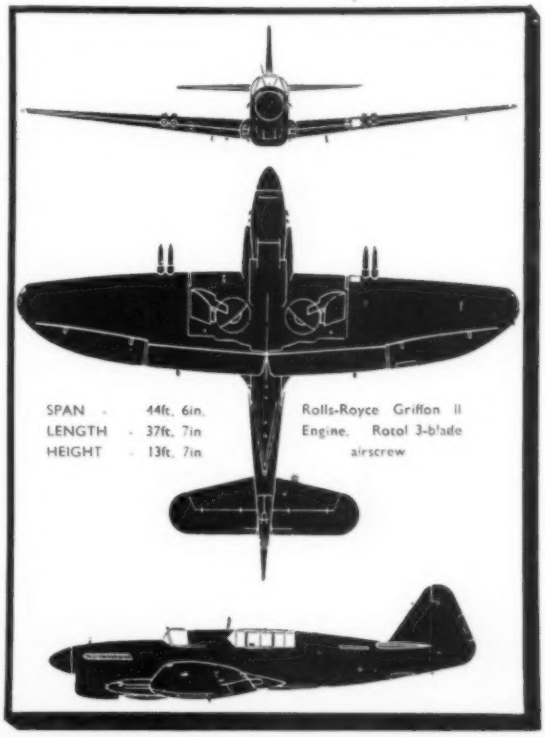
Latest Fleet Air Arm Fighter-

Reconnaissance Aircraft

FAIREY FIREFLY

THE Fairey Aviation Company have given to this country some very fine aircraft during the past two decades, and reference to some of them was made in the November 9th issue of *Flight* wherein the latest Fairey machine, the Firefly, was introduced. This is not perhaps, the place where dealing with the factual aspects of an aircraft, reference is best made to its operational history however short that history may be. Nevertheless, the Firefly has done some really excellent work with the Fleet Air Arm in the past months. It found the *Tirpitz* after that now deceased vessel had been moved, and Lancasters delivered some 12,000 lb. bombs as a result. This is one of the incidents of the grand score the Firefly is piling up for itself. One can say without reserve that, when the news can be disclosed, the work done by the Fleet Air Arm Firefly will be among the high lights of the Royal Navy's air operations.

The Fleet Air Arm have been waiting for a machine such as the Firefly for a very considerable time. The vagaries of the work they have to do, combined with the limitations imposed by carrier operation, make a set of conditions imposed upon the aircraft designer which might well cause the poor man to say "I give up." However, Mr. H. E. Chaplin, fortunately, did not think of giving up, with the result that the Navy at last has an aircraft capable of staid and sedate inquisitive passage which in a trice can be transformed into flashing speed.



Although the temper of the Firefly is capable of such extremes, she nevertheless remains perfectly mannered and sweetly responsive to the will of her pilot. In short, she is a perfect lady with venomous possibilities.

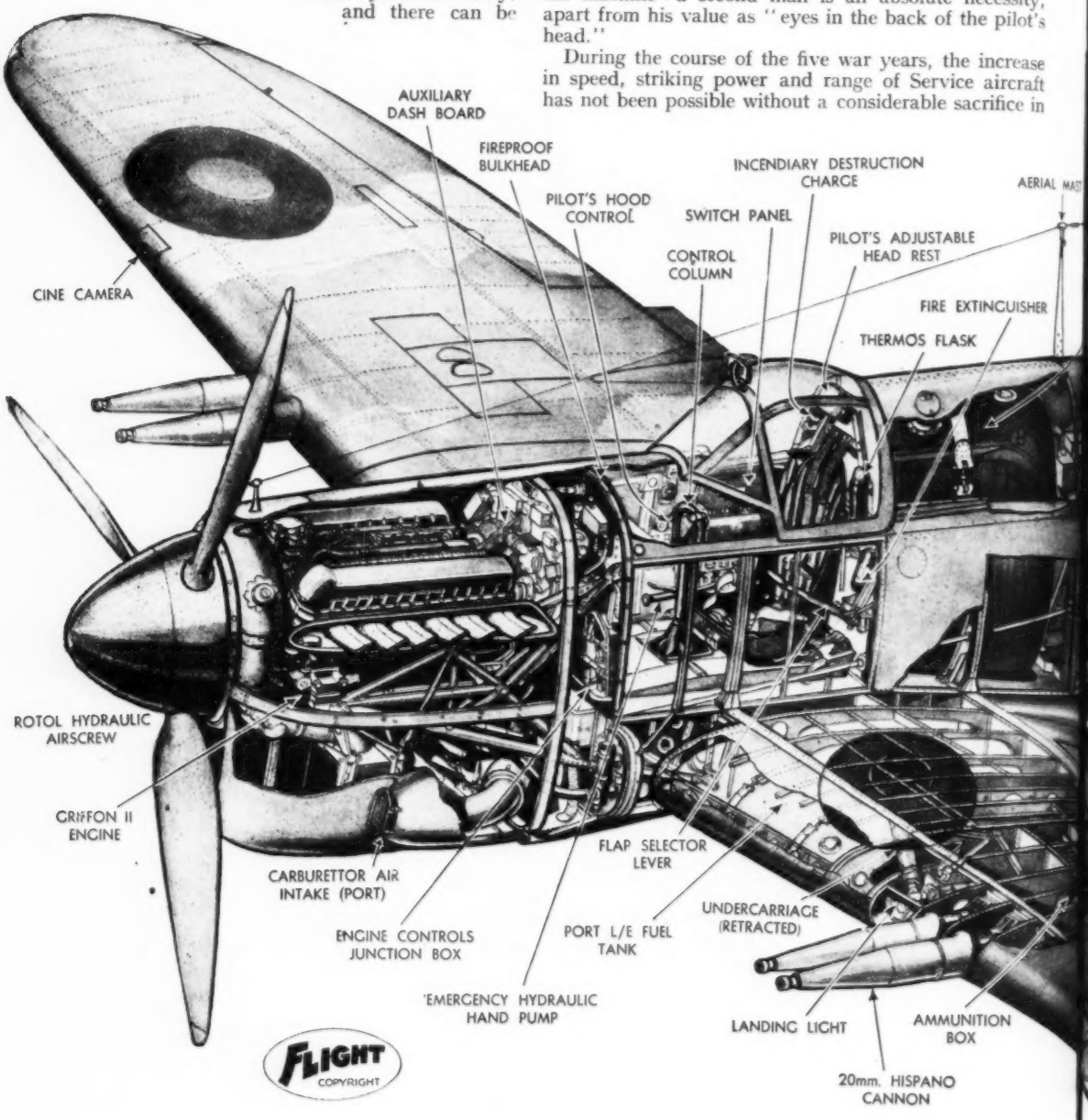
One cannot help but admire the ingenuity of the designer in providing it in the severe limitations imposed by a two-seater aircraft of really clean lines. It is capable of very extended range, housing all the multifarious equipment necessary for its work, and yet withal having a maximum performance eclipsed only by the quickest of the latest single-seater fighters. In addition to this, the speed-range is unapproached by any other aircraft. For this quality credit must be

FAIREY FIREFLY . . . . .

apportioned between the manufacturers for the amazingly efficient flap system, and the Rolls-Royce company for the equally wonderful Griffon. Without these two qualities the Firefly would be just another aircraft.

The decision to make the machine a two-seater was taken by the Admiralty, and there can be little doubt that the decision was a wise one. The rear seat is for an Observer/Radio-operator whose job it is to operate the numerous scientific devices with which to-day's aircraft are equipped. It would be virtually impossible for one man to fly the aircraft and work this, that and the other gadget in addition to his control of the machine—a second man is an absolute necessity, apart from his value as "eyes in the back of the pilot's head."

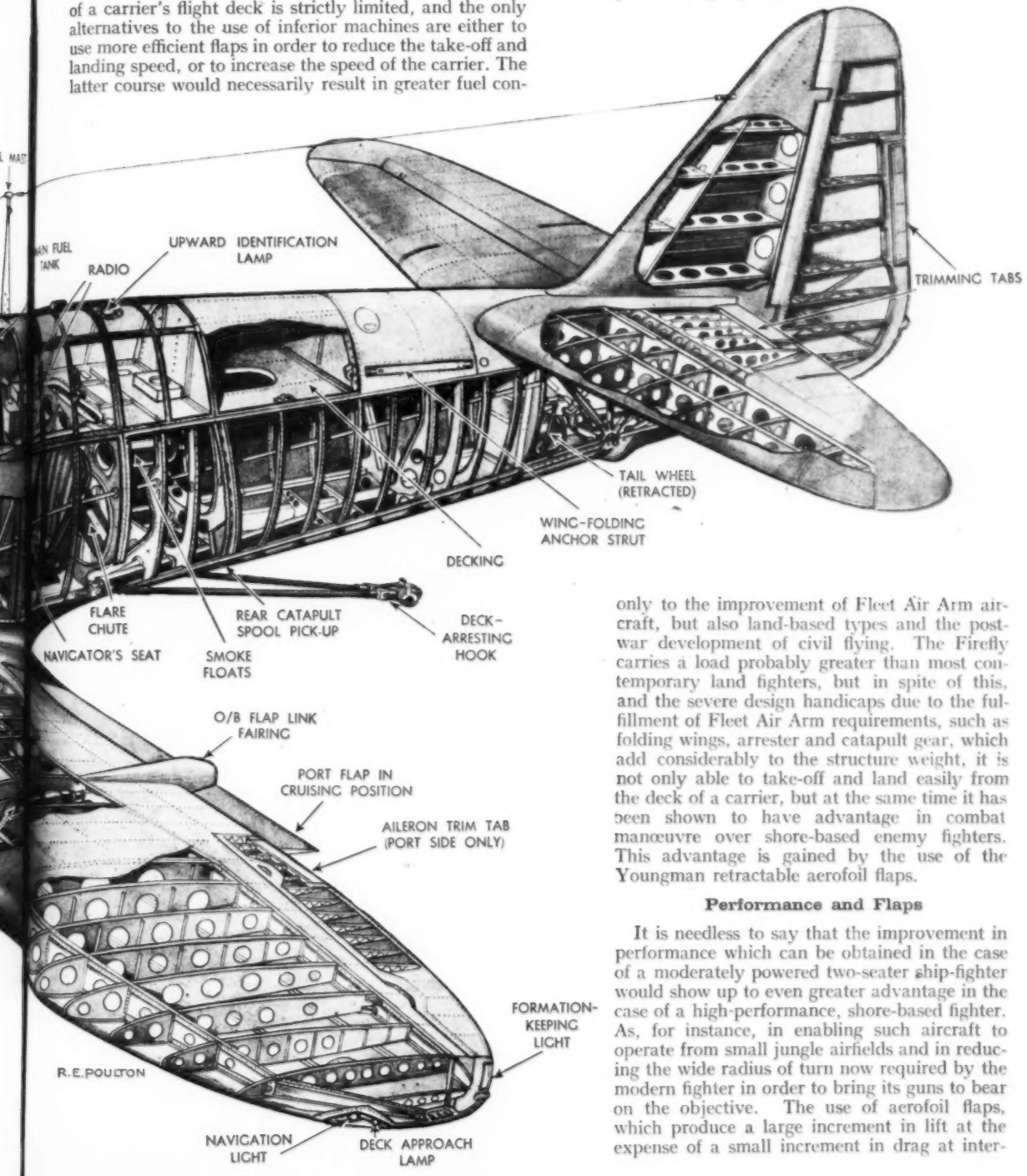
During the course of the five war years, the increase in speed, striking power and range of Service aircraft has not been possible without a considerable sacrifice in



Construction and the disposition of the main features of the Fairey Firefly can be followed in this special cut-away illustration by Mr. R. E. Poulton, which makes clear the forethought and ingenuity which have gone into the design. In particular, it shows the terrific complication of the modern military aircraft. Even allowing for the special Fleet Air Arm requirements such as wing-folding and arrester-gear the airframe itself is comparatively simple.

other directions due to the steady increase in wing loading. This sacrifice is reflected in the enormous runways which are now required to get the modern bomber into the air, and in the decrease of turning manœuvrability of our fighting aircraft. The effect of this increase in wing loading is even more pronounced in the case of naval aircraft because, unlike a land airfield, the length of a carrier's flight deck is strictly limited, and the only alternatives to the use of inferior machines are either to use more efficient flaps in order to reduce the take-off and landing speed, or to increase the speed of the carrier. The latter course would necessarily result in greater fuel consumption and at the same time impose serious tactical limitations on the carrier's movements.

With these points in mind, and the still further increase in wing loading which is likely to take place in the future, the need is apparent now more than ever for extended research and development into means for increasing the efficiency and lifting capacity of wings with the view, not only to the improvement of Fleet Air Arm aircraft, but also land-based types and the post-war development of civil flying. The Firefly carries a load probably greater than most contemporary land fighters, but in spite of this, and the severe design handicaps due to the fulfillment of Fleet Air Arm requirements, such as folding wings, arrester and catapult gear, which add considerably to the structure weight, it is not only able to take-off and land easily from the deck of a carrier, but at the same time it has been shown to have advantage in combat manœuvre over shore-based enemy fighters. This advantage is gained by the use of the Youngman retractable aerofoil flaps.



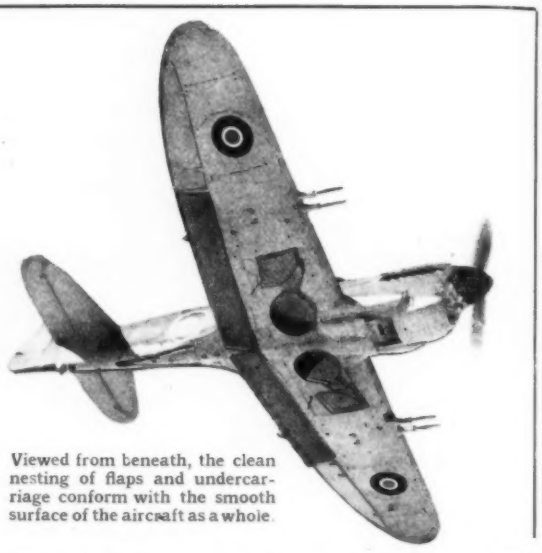
Performance and Flaps

It is needless to say that the improvement in performance which can be obtained in the case of a moderately powered two-seater ship-fighter would show up to even greater advantage in the case of a high-performance, shore-based fighter. As, for instance, in enabling such aircraft to operate from small jungle airfields and in reducing the wide radius of turn now required by the modern fighter in order to bring its guns to bear on the objective. The use of aerofoil flaps, which produce a large increment in lift at the expense of a small increment in drag at inter-

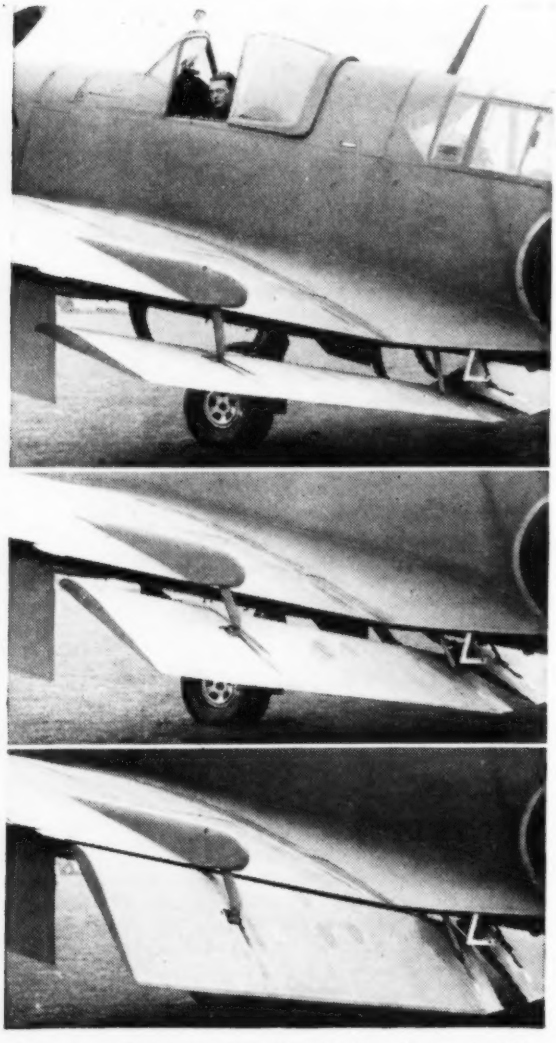
FAIREY FIREFLY

mediate flap settings would result in a reduction in the minimum radius of turn at full throttle in level flight, which would give the pilot an enormous tactical advantage over his opponent, not only in attack but in taking evading action.

As long ago as 1936 the N.A.C.A. investigated the properties of the aerofoil flap and pointed out its advantages, but, strangely enough, little effort has been made to make use of this form of high-lift device, mainly, perhaps, because of an erroneous impression that its installation must result in an increase in weight which would largely offset the advantage gained in increased lift. The designer claims that it can be shown that in actual fact an aircraft built to conform with certain requirements of take-off, landing and load-carrying capacity will show a considerable saving in weight if equipped with aerofoil flaps. Conversely, in a given design, the useful load may be very substantially increased without detracting from the take-off and landing qualities.



Viewed from beneath, the clean nesting of flaps and undercarriage conform with the smooth surface of the aircraft as a whole.



The Fairey Youngman flaps shown in the three selectable extended positions. (Top) Cruising. (Centre) Take-off. (Bottom) Landing. Cruising selection gives manœuvrability and slow flying; take-off, very high lift with small drag; landing, high lift and high drag so that when the throttle is cut the machine sits down immediately.

It is also frequently argued that the use of high-lift flaps necessarily involves difficulties in longitudinal control and trim, and there are admittedly some examples in which troubles in this direction have been experienced. Mr. Youngman points out that there is no reason why a machine equipped with high-lift flaps, giving nearly double the lift increment of a corresponding split flap, should present any difficulty in longitudinal control and trim without recourse to adjustable or oversized tailplanes, provided certain fundamental conditions are fulfilled. These conditions may be thus summarised.

(a) The flap should extend at least up to the wing root and, if possible, under the body in order that the tailplane may derive the full benefit from the increased downwash produced by the lowering of the flaps.

(b) The elevator balance should be adjusted to give the correct relation to make the aircraft trim automatically when the flaps are lowered and raised.

Lift and Drag

The advantage of this form of flap over the split flap is easily appreciated by a comparison of the profile drag and lift coefficient of the split and aerofoil flaps.

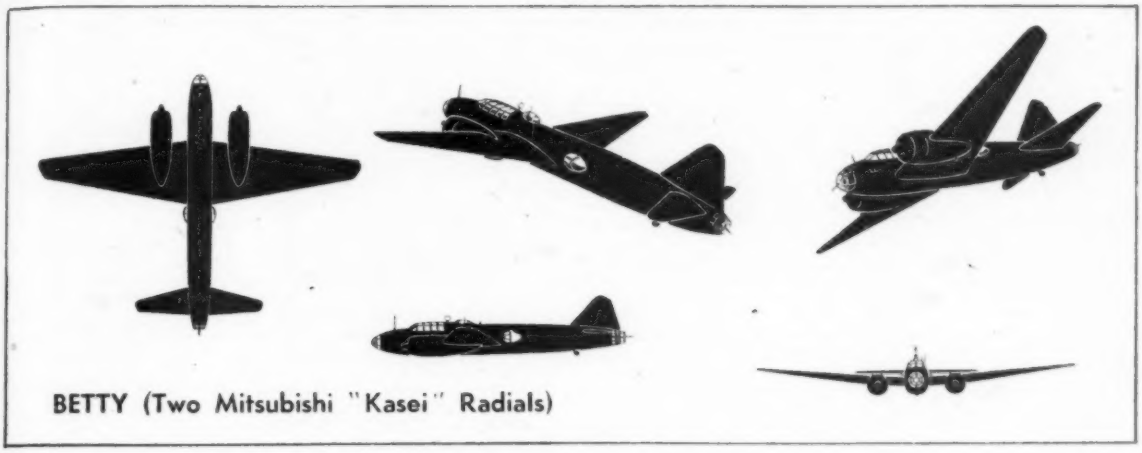
It will be seen that whereas the opening of a split flap causes a rapid increase in profile drag, there is no very appreciable increase in the profile drag of the aerofoil flap up to a point beyond that at which the split flap stalls. The aerofoil flap, moreover, gives a considerable increment in lift over the split flap. The improvement in take-off, manœuvring and slow cruising which can be obtained by the aerofoil flap is not, however, directly related to the measured coefficients. Slip stream plays an important although a not easily calculable part, but it goes without saying that the effect of slip stream will be still further to increase the advantage of the low-drag flap for all the specified conditions of flight.

It has been stated that the aerofoil flap presents no difficulty in its installation which is, however, not to say that any design is suitable for the incorporation of high-lift flaps. It is almost invariably necessary to consider their application in the initial stages of design. In the form of flap shown, we have by no means reached the limit of high lift, and in time it should be possible through development to obtain a lift increment approaching double the amount.

In the past, flaps have figured almost entirely as an aid to landing, but the advent of the Firefly demonstrably proves that flaps, in addition to take-off and landing, can also contribute largely to the safety and more successful operation of aircraft in flight.

Studies in Recognition

Aircraft in Flying Attitudes



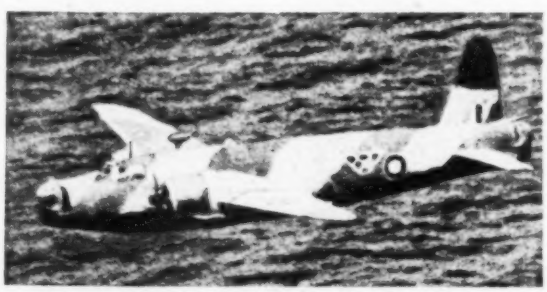
BETTY (Two Mitsubishi "Kasei" Radials)

A SHORE-BASED multi-seat bomber used by the Japanese Navy, "Betty" is a Mitsubishi product which bears rather more than a passing resemblance to our own Vickers Wellington, particularly in plan view. Actually Betty has a slightly shorter wing-span and is nearly 4ft. longer overall than the Wellington, but though this difference in proportion is obvious enough when the two are seen side by side, it is very doubtful if it would be sufficiently noticeable for a snap recognition of the Jap when seen alone, without the confirmation of certain other differences.

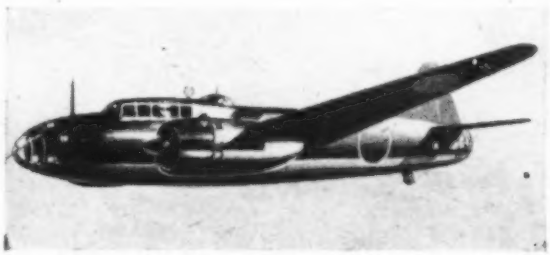
As is so very often the case, the fin and rudder provide the quickest and easiest recognition feature (assuming the aircraft is not in some attitude which masks its vertical tail surfaces) for whereas the Wellington is marked by its familiar tall, tapered fin and rudder, those of Betty have a very broad base and taper to a flat apex which slopes downwards towards the trailing edge—almost like a triangle with the top corner sliced off at an angle. From a side view, the transparent streamlined nose of Betty is quite distinct from that of the Wellington with its power-operated gun turret, and much the same applies to the tail which, on Betty I is cone-shaped and on Betty II has been cut short, presumably to provide a wider field of fire from the single hand-operated gun.

The fuselage, too, is wider than that of the Wellington, and has a blister on each side aft of the trailing edge. Being a mid-wing type with dihedral from the roots, the Jap closely resembles the Wellington head-on, but can be distinguished by its three-quarter underslung engines which, by virtue of the shorter span, do not seem so close to the fuselage.

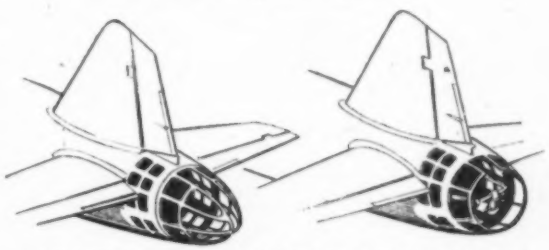
Betty is faster than the Wellington and has a top speed of 279 m.p.h at 11,500ft. Range is about 1,500 miles, and normal bomb-load 1,760lb. Dimensions:- Span 82ft. 4in., length 65ft. (approx.).



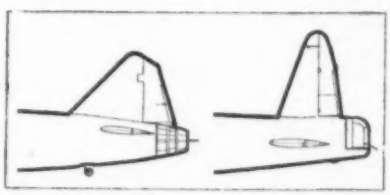
Vickers Wellington Medium-heavy Bomber.



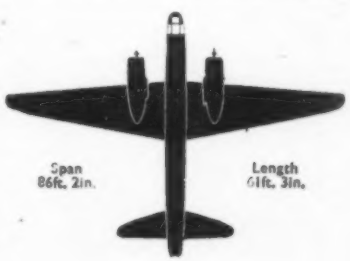
Mitsubishi Navy Bomber, "Betty."



Betty I has a cone-shaped tail (left) and Betty II a blunt one.



The low aspect-ratio fin and rudder of Betty (left) has raked apex, and is quite distinct from the tall high aspect-ratio surfaces of the Wellington.



Though very similar in plan to Betty, this silhouette of the Wellington shows the much slimmer fuselage and wings of higher aspect-ratio, the wide span of which makes the radial engines appear to be set appreciably closer to the fuselage.

THE "GEN" BOX

Astonishing Release of a Well-kept Secret

FOR some long while now numerous reports have been given in the Press and over the radio of bombing being carried out through cloud or by "instruments."

The secret of the existence and Allied use of the particular "instrument" involved was sprung upon the world in a somewhat similar fashion to the jet-propulsion story. Wide publication in America enforced publication in this country. But without digressing into the unfortunate circumstances of the disclosure we can deal with as much as has been already released.

Basic principles of the device, known to the R.A.F. as the "black-box" or "gen-box," are not new, nor are they revolutionary—all that is new (as in jet-propulsion) is the application of these principles to a given objective.

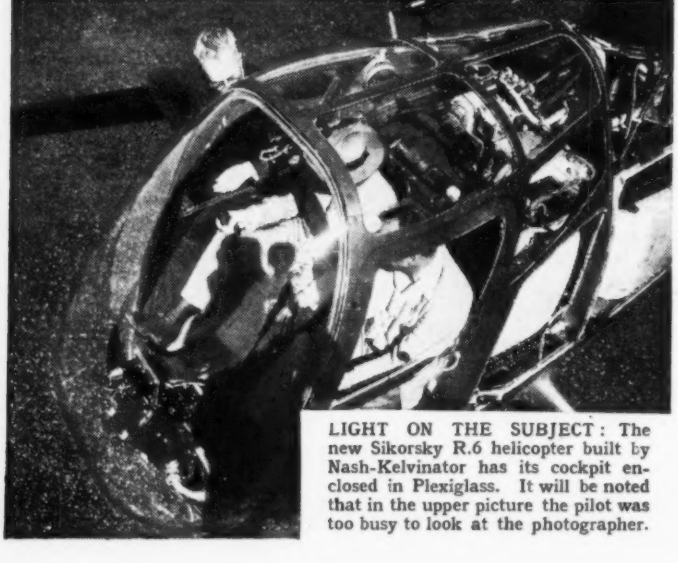
Briefly, the device is a radio transmitter emitting a signal which travels at light-speed, i.e., 186,000 miles per second, impinges upon reflecting surfaces of any and all objects within its field and bounces back, at the same speed, to the receiver unit in the aircraft. In fact, a version of the echo principle.

Here the signal is translated electronically on the ordinary cathode-tube principle to the object screen set before the observer, the image seen upon the screen being a reproduction of the ground being flown over. Water shows up as darker patches through the greenish fluorescence of the screen illumination, whilst solid objects, houses, ships, etc., are indicated as lighter patches, the outline of which is roughly similar to their plan-form. Thus, a town over which the aircraft is flying will be represented upon the screen as an irregular shape of similar outline to that seen visually by an observer looking down—provided there were no interfering cloud.

This latter case—cloud—is, of course, the condition which really shows the great advantages of the device, for cloud troubles it not at all. Indications are given on the object screen only from reflecting surfaces of solid objects, and the tenuous nature of cloud offers no "bounce."

Apart from these salient features one can say little more about the device. The invention, together with almost every other Radar device, was completely British, and, in conformity with the bi-lateral agreement between America and England, we presented them with full details of everything we knew. Technicians in the U.S. then got busy and developed on their own lines that which we had devised. It is thus quite truthful to say that a good deal of the scientific equipment used by the Allies is of American *manufacture*, but as far as Radar is concerned, the concept and development spadework is British and, quite naturally, most of our own forces are equipped with British-made devices.

Although the device is being used at the moment primarily for bombing attacks, there is obviously a tremendous future for it in a civil world. What with this and the various other equally remarkable instruments evolved and perfected, all-weather commercial flying in safety appears to be in sight.



LIGHT ON THE SUBJECT: The new Sikorsky R.6 helicopter built by Nash-Kelvinator has its cockpit enclosed in Plexiglass. It will be noted that in the upper picture the pilot was too busy to look at the photographer.

AUSTRALIAN VIEW

MR. ARTHUR DRAKEFORD, Australian Air Minister and Minister for Civil Aviation, now in Chicago taking part in the civil air conference, is coming to Britain at the invitation of Sir Archibald Sinclair, Secretary of State for Air, it was stated in Canberra.

He will secure information of value to the Commonwealth Government in giving effect to the establishment of a Statutory authority for the control of Australian inter-State civil airways.

Mr. Drakeford will also deal with matters affecting R.A.A.F. personnel in the R.A.F.

U.S. TECHNICAL MISSION IS ASTONISHED

ASTONISHMENT and admiration were expressed by members of the U.S. industrial standards technical mission, now concluding a visit to this country during which they have visited many aircraft factories and associated firms, at a Press interview in London last week.

Mr. Eric Dudley, Assistant Director of Engineering in the Curtiss Wright Corporation, said: "We have found a completely new conception of what Britain is doing in manufacturing. We are greatly surprised and thoroughly impressed with the magnitude of the job done—especially in view of the difficulties of wartime production.

"We are taking back to America a report that will be highly complimentary of the progress British industry has made. There is much we can learn from your particular types of manufacture."

Mr. L. D. Bonham, Materials Engineer of the Lockheed Corporation, said: "We are greatly impressed with the way British engineers have designed the highest type of military aircraft with technical staffs far smaller than those customarily found in the U.S."

The Mission, which is under the wing of Flt. Lt. Moffat, R.A.F., of the British Air Commission, Washington, came to Britain at the joint invitation of the S.B.A.C. and the Ministry of Aircraft Production.

Other members of the mission were:—Mr. James D. Redding, staff representative and manager, Aeronautics Division; Mr. Gustav Carvelli, Society of Automotive Engineers; Mr. Eugene W. Norris, director of technical services, A.C.C.A., and secretary of N.A.S.C.; Mr. Thomas P. Hearne, Ryan Corp., and chairman of the international standards committee, N.A.S.C.; and Lt. Col. G. R. Gaillard, U.S.A.A.F., of the working committee of the Aeronautical Board.

CIVIL AVIATION

What U.S. Expects . . . .

Future Volume of Traffic : Importance of Freight

A FORTNIGHT ago a scholarly audience of members ot the American Academy of Political Science applauded when Mr. L. Welch Pogue, Chairman of the Civil Aeronautics Board, told them that air transport can become the political, economic and social instrument of an internationalism with new power and promise!

Coinciding with reports from the Chicago Conference, references to internationalism in air transport somehow bring to our mind the story of a lady who, when gazing at a little child, exclaimed: "But, my dear, isn't she wonderful! I could eat her. . . ." Clearly, an example of an inverted altruism.

* * *

But while Chicago conference rooms still resound with the humming of passionate debates the practical question: "What is expected in the U.S. in terms of future air transport business," is by no means answered in unison.

Dr. J. Parker Van Zandt, in his recent Brookings Institution book, "Civil Aviation and Peace," said: "If by intelligent merchandising we can develop a travel volume of some four million U.S. overseas passenger trips a year, we may reasonably expect to transfer to other countries through traveller expenditure abroad about 1,000,000,000 dollars annually, exclusive of fares, which they can use to purchase American exports and to service their financial obligations. . . ."

To Equal Surface Traffic

With the New York-Paris round-trip fare being $198, with a ten per cent discount for the return journey, Dr. Van Zandt assumes that the volume of operations will be "more than 18 times the total passenger-miles flown by all American flag airlines in 1941 in both domestic and international service; and close to the total inter-city common carrier passenger traffic by rail, bus and air in the U.S. in 1940."

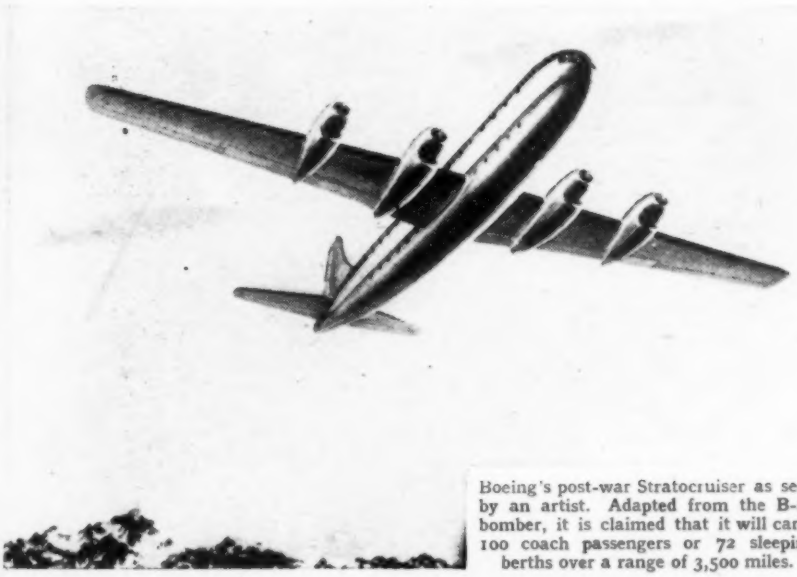
Pan American Airways' John C. Leslie, one of the leading American experts in air transport, thought that "the average man" was expected to provide the great bulk of business, with tourist and pleasure travelling making up two-thirds of the total 138,425 round-trip passengers expected to be carried by the American flag airline in a typical post-war year. Fares: New York-London, 148 dollars, or only 4 cents a mile, were no higher—he said—than the average tourist steamer rates and sharply below the first-class and cabin steamer rates.

And how about cargo? "By the end of the ten years following the war, it is probable that annual revenue from air cargo will exceed that received from passengers," said the chairman of the C.A.B. recently. "Airlines, like the railroads, started off as carriers of passengers and will develop into large carriers of cargo," he added. Moreover, he foresaw a parallel reduction of cargo rates and the development of new business in the carriage of products which hitherto could not find their way into commerce, either because of the remoteness of their production regions or on account of their perishable nature.

Exports by Air

More specific are the forecasts of Dr. Edward P. Warner, vice-chairman of the C.A.B. In an address before the American Merchant Marine Conference in October he expressed his belief that within five years after the war as much as 0.25 per cent. of all American exports—but not appreciably more than that, he warned—may be moving by air. On the basis of estimates he considers it reasonable to hope that the annual American air-cargo tonnage to be developed during the next four years may amount to 10,000 tons to Northern Europe; 5,000 tons to the Mediterranean area; 1,000 tons to North Africa; 1,500 tons to Australia; 4,000 tons to the Far East; 3,000 tons in each direction between the U.S. and South American points; and 6,000 between the U.S. and Caribbean and Central American points.

Disregarding the more speculative American expectations for the post-war development of air transport, one might conclude with Dr. Warner's' forecast, that "the business will continue to be primarily one of carrying passengers, although by no means exclusively so; that much of the increased passenger business will be newly created, due to the new characteristics of air service, rather than obtained by diversion from surface vessels; that air cargo is likely to be increased ten times the pre-war volume or more on routes that already had good air service, with correspondingly high figures where no such service existed; but that even then air cargo will remain a very highly specialised and selective traffic, representing only a tiny fraction of the vast mass of freight carried by the Merchant Navies of the world."



Boeing's post-war Stratocruiser as seen by an artist. Adapted from the B-29 bomber, it is claimed that it will carry 100 coach passengers or 72 sleeping berths over a range of 3,500 miles.

GOING GLOBAL

NOT to be outdone by the American air transport companies, Pennsylvania-Central Airlines have filed an application with the U.S. Civil Aeronautics Board for world air routes radiating from Washington, New York and Chicago.

The proposal embodies one route across the North Atlantic to Scandinavian points and Moscow; the second across the South Atlantic to points in Africa, and a third route to the Far East via Alaska.

CIVIL AVIATION NEWS

LINKING THE CAPITALS

WASHINGTON and Ottawa are to be linked up by a scheduled service operated by Colonial Airlines Inc.

The company, which has hitherto maintained twelve daily services on the New York and Montreal route, has been awarded the National Certificate of Safe Operations for 1943 for accident-free operation.

Colonial Airlines originally specialised in "ski-specials," carrying American tourists to winter sport resorts in Canada.

SOUTH AFRICAN VIEW

ADDRESSING the Associated Scientific and Technical Societies in Johannesburg, the Minister of Transport, Mr. F. C. Sturrock, expressed himself unofficially as in favour of post-war Government owned and operated air services for South Africa, though he paid tribute to the good work of private enterprise, especially in the provision of air taxi services

He envisaged the whole of South Africa as one air region with regional systems of communication, co-operating and feeding international and Commonwealth trunk air services. In these Commonwealth services the Dominions should be equal partners with Britain, jointly operating their respective routes. Mr. Sturrock also stressed the importance of the safety factor in air travel, emphasising that the basis of all planning must be on the international plane.

A BILATERAL AGREEMENT

AN agreement between the U.S. and Spain covering international air services was signed by the Spanish Foreign Minister and the U.S. Ambassador.

It provides for the establishment of three tran-oceanic air routes, the terminal points being New York and Madrid, Barcelona and Seville.

Madrid becomes the base from which other routes begin, Seville, in Southern Spain, is the terminal point of a line from the West Indies, Brazil and West Africa, and Barcelona will be the stopping place on the way to Marseilles and other points beyond.

The agreement, which becomes immediately effective, provides for reciprocity on the three routes, and the aircraft of each contracting party are given the use of the civil airports of the other.

Traffic between points on these lines situated within the sovereign territory of either party will be reserved exclusively for exploitation by the country concerned.

STORM IN AUSTRALIA

FROM Canberra it is reported that the Commonwealth Government is basing its plans for post-war overseas air service on the assumption that they will be Government-owned and controlled. Before announcing its decisions—it is said—the Government awaits the outcome of the Chicago Conference.

The main service affected is the trans-Pacific route, which the Government proposes to run during the war, and the Freemantle-Colombo section of the Australia-U.K. service in which it is interested.

Meanwhile a temperamental exchange of views took place in the Australian House of Representatives, in the Senate and in the lobbies, with the opposition, supported by the Country Party, emphatically opposing the Government project of nationalisation.

Mr. Menzies, described by the Deputy Prime Minister as a champion of big business, said that "it is monstrously unjust for the Government to take over the airlines just as a period of commercial success in aviation is about to begin."

In spite of opposition coming from these quarters, the Government seems to be determined to go ahead with the project, and it was stated that "the proposal has been heartily approved by the Cabinet, and the control of a great public utility is a very important question which is outside the realm of party politics."

While tentative plans have been made for the Government to operate the airlines as from July 1st, 1945, Mr. Drakeford, the Minister of Civil Aviation, at present in the U.S., is to investigate there the possibility of purchasing a fleet of new aircraft.

The Government already purchased twelve DC-3 transports released by the U.S. under lend-lease and will lend them to the air transport companies for the interim period until the establishment of a National Authority.

CIVIL RADAR

THE application of Radar and other wartime radio developments to civil aviation and the establishment of a permanent Central Office in London was foreshadowed at the second Commonwealth and Empire Conference on radio for civil aviation recently concluded at Ottawa.

Developments discussed included short- and long-distance radio aids to air navigation, facilities for landings and take-offs at airports irrespective of weather conditions, means of reducing collisions between aircraft in mid-air or with fogbound mountain peaks, and facilities for locating lost aircraft.

Sir Robert Watson-Watt, scientific adviser on telecommunications at the Air Ministry, and head of the U.K. Delegation, stated that the conference has shown more clearly than ever before that the transfer of modern radio technique, and particularly Radar technique, from military to civil applications will make a noteworthy contribution to the regularity, punctuality and safety of civil air transport services.

A third conference may be held next summer in Australia, it was announced. All data from the conferenee are available to the U.S. authorities, as was done after the first conference in London last February.

OPERATORS' ORGANISATIONS

LAST week we recorded that Col. Gorrell, president of the Air Transport Association of America, had invited the secretary of I.A.T.A. to America for a discussion of the formation of a world-wide organisation of air operators. At the time *Flight* went to press we did not know that the C.I.A.T.O. had also been invited, and that Mr. Farey-Jones was representing the conference. In this connection, the following letter has been received from Lt. Col. the Rt. Hon. Lord Grimthorpe, chairman of the C.I.A.T.O.

We of the Conference of International Air Traffic Operators gladly welcome the publicity which *Flight* has been good enough to give to steps which have been, and which are being, taken by air transport operators to promote and develop an international organisation which, as you suggest in your last issue, will provide "any international authority which may emerge from the present Chicago Conference . . ." with ". . . a valuable source of expert council. . . ."

In your article to which I refer, however, you state that Col. Gorrell, president of the Air Transport Association of America, has invited the secretary-general of I.A.T.A., the pre-war international organisation of air traffic operators, to go to the United States "to discuss the formation of a world-wide organisation of air operators."

In order that there should be no misconception of the position, may I be allowed to point out that Col. Gorrell issued two invitations to these talks, in which he says, "I am sure that progress could be made in planning for the establishment of such a (world) organisation if a representative of C.I.A.T.O. and a representative of I.A.T.A. could meet with me in Washington in the very near future. . . ."

Therefore, the proposed talks in Washington will be three-sided between Col. Gorrell, of the American A.T.A., a representative of C.I.A.T.O., and a representative of the pre-war I.A.T.A.

As your readers are probably aware, the American A.T.A. has as its members sixteen American domestic operating companies. C.I.A.T.O., which was founded last May, has fourteen member companies from ten countries and, before the war, I.A.T.A. had twenty-nine member companies from twenty-four countries. In the case of I.A.T.A., eight of its pre-war members are now enemy or ex-enemy nationals, and four others are no longer in existence as separate bodies which, in view of its statutes, creates certain obvious difficulties that we hope may be smoothed out as a result of the forthcoming talks in Washington so that a fully representative international organisation of operators may emerge, to the definite advantage both of the operators and, incidentally, of the Governments concerned.

Finally, we would like to correct any impression that we view the matter in the light suggested by the last two paragraphs of your Editorial headed "The Civil Air War."

(signed) GRIMTHORPE,
Chairman of the Conference.

[Mr. F. W. Farey-Jones has left for the States to represent the C.I.A.T.O. at the Washington talks.]

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Photography can aid actual production in works

One of the most important applications of photography to industry is its use as a means of copying engineering drawings on to metal, wood, etc.

In this process the metal, or other substance, is first given a light-sensitive surface by means of 'Kodak' Transfer Sensitising paper, and the drawing is then photographed on to it.

The normal method of carrying out such copying is, of course, by means of hand scribing, but the photographic method offers two advantages over the manual method: (1) Much greater speed (2) The drawing can be reproduced any number of times without variation, and the possibility of variations between finished templates or parts which are intended to be identical is therefore reduced.

Industrial firms wishing to investigate the possibilities of this method should write to

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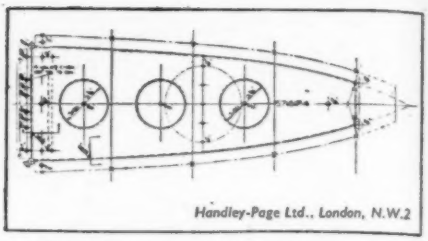
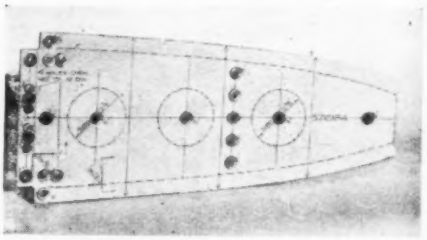
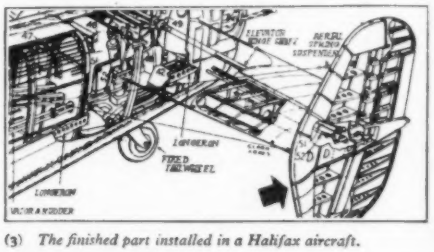
Illustrations by courtesy of Handley-Page Ltd.



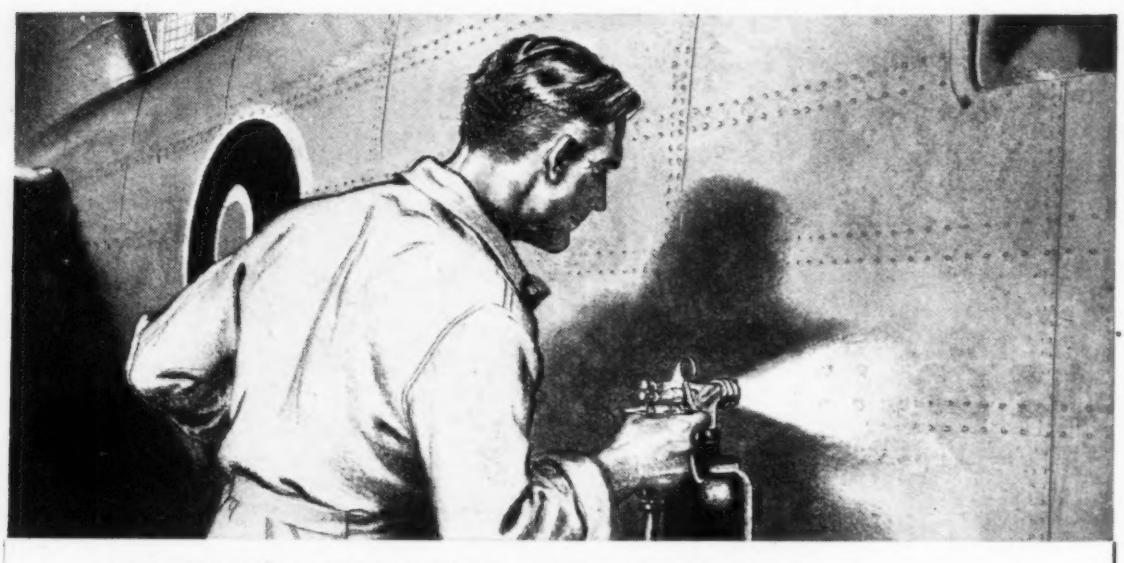
(1) *Original drawing as prepared by draughtsman.*



(2) *The drawing is photographed on to steel and a template is made.*



(3) *The finished part installed in a Halifax aircraft.*



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A Civil Power Plant

Liquid-cooled Engines Suspended Below Front Wing Spar : Radiator Above Reduction-gear Casing

By C. A. H. POLLITT

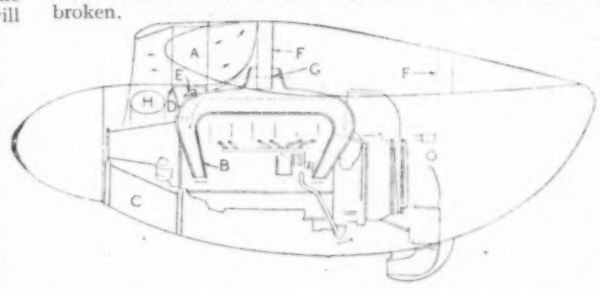
ONE aspect of post-war civil aviation has received insufficient attention. This concerns the power plant for the future commercial aircraft, and without reviving the air-cooled versus liquid-cooled controversy, I venture to submit a scheme I have evolved for the installation of a liquid-cooled engine.

Failing the early introduction of an entirely new prime mover, we are entitled to assume that development will proceed, as in the past, by a process of design refinement in which every avenue will be explored and progress achieved step by step. At the same time, we shall have to contend with limitations similar to those obtaining at present, and for each gain in performance there will probably be a corresponding increase in weight or drag, imposed by other causes.

One of the greatest bugbears will be superfluous weight, and this thought inspires the belief that a vigorous cleaning-up, and indeed rearrangement, of the present power plant will effect a considerable and abiding economy in weight, and will probably improve the performance of the aircraft.

The scheme in question is applicable to multi-engined types only and was originally conceived for a machine in the 20,000 lb. category. Apart from the question of weight economy, it also aims at satisfying other conditions laid down by the operating companies. Prominent among them is the demand for quick interchangeability.

Airline operators require that a power plant shall be capable of removal from the aircraft in a space of time not exceeding 15 minutes. To achieve this it is essential that the work involved be reduced to a minimum. Now the removal of a power plant from a machine such as the Lancaster involves draining the oil system, since the oil tank is aft of the bulkhead. The engine controls, including those for throttle and constant-speed unit, have also to be disconnected, and the engine pick-up bolts must be withdrawn. The coolant system is drained only when a cabin-heating system is incorporated, but all electrical connections on the bulkhead for aircraft services must be broken.



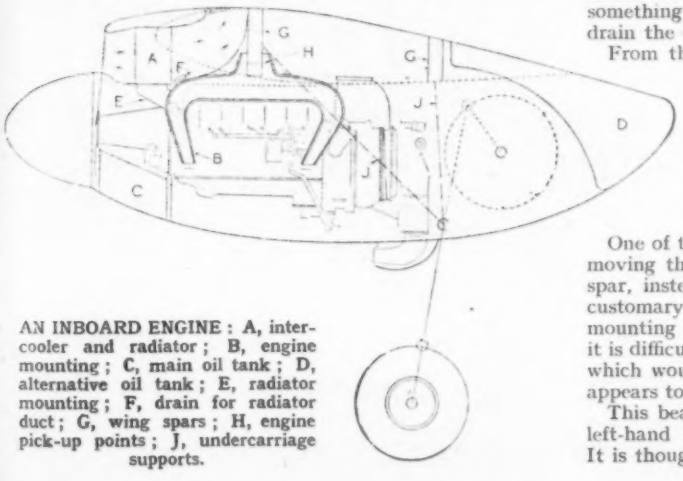
AN OUTBOARD ENGINE : A, intercooler and engine radiator; B, engine mounting ; C, oil tank ; D, radiator mounting ; E, drain for radiator duct ; F, wing spars ; G, engine pick-up points ; H, header tank.

Thus there is quite a lot of work involved in the operation, and without disclosing the time taken to remove a Lancaster power plant we may significantly observe that something like 15 or 20 minutes are required merely to drain the oil tank.

From the two general arrangement drawings it will be seen that the layout of the proposed power plant is fundamentally different from the conventional layout. The entire engine has been moved bodily aft and suspended directly below the wing front spar. The reduction-gear casing has been extended, and the main radiator assembly located above this instead of below the crankcase as hitherto.

One of the main differences is the engine mounting. By moving the engine aft and suspending it below the front spar, instead of some five or six feet in front of it as is customary practice, the loading stresses in the engine mounting are considerably reduced. In this new position it is difficult to conceive a lightly-stressed tubular structure which would do the job, and a fabricated beam-mounting appears to be more readily suited to the purpose.

This beam mounting comprises one right-hand and one left-hand assembly, each of a substantial box section. It is thought that detailed design investigation will reveal



AN INBOARD ENGINE : A, intercooler and radiator ; B, engine mounting ; C, main oil tank ; D, alternative oil tank ; E, radiator mounting ; F, drain for radiator duct ; G, wing spars ; H, engine pick-up points ; J, undercarriage supports.

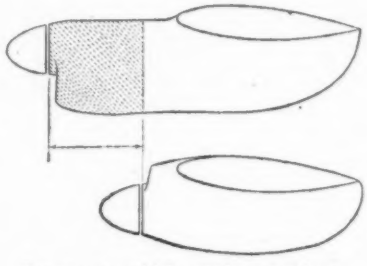
A CIVIL POWER PLANT

the possibility of introducing a series of flanged lightening holes to reduce the weight without interfering with the strength requirements. In this form it compares favourably with any other previously conceived engine mounting on the score of weight.

The general design is contingent upon two conditions: it must allow complete access to sparking plugs, and no restrictions of any sort should be imposed on the design of a conventional exhaust system. The shape of the mounting in side elevation is thus prescribed within fairly definite limits, and the result is an almost symmetrical design.

Arrangement of Radiator

The original conception of this power plant was that it should virtually be a compromise between a wing radiator installation and the conventional underslung radiator nacelle. By placing the radiator above, instead of below, the front end of the engine, it is thus contained, in front elevation, almost completely within the frontal area of the wing, thereby reducing to some extent the total frontal area and wetted surface of the nacelle.



Degree to which engine overhang and length of cowling are reduced by the underslung arrangement suggested.

It is intended that the radiator assembly be mounted on the forward end of the engine mounting, and although accommodated within the compass of the wing it is not part of the wing structure. This is considered to be an advantage over the ordinary wing installation and means no disconnecting of pipes in the event of the entire nacelle having to be removed. This is an attractive feature and a step towards quick removal and interchangeability.

Access to within the vee of the cylinder blocks need not necessarily be impeded, though it would be an advantage to make the rear radiator duct detachable. This could be arranged without any unnecessary structural complications.

Much of the former prejudice against the use of liquid-cooled engines in civil aircraft centres around the bogy of servicing the cooling system, a messy job and an addition to the routine servicing of the more popular air-cooled installation. It is felt that particular attention must be paid to this aspect of servicing. To this end something is achieved by having the radiator assembly on top of the engine. In this position it follows that all pipe connections, being still on top of the radiator, will also be just within the top cowling, where, by the simple expedient of opening a hinged or completely detachable panel, all connections would promptly be within very easy reach of anyone on top of the wing.

Undercarriage

The undercarriage has never been the concern of the power plant engineer, and although the scheme under discussion embodies the undercarriage as part and parcel of the complete unit, we are not committed to covering the entire detail design of it. In fact, it is not proposed to go into any greater detail than to prove the practicability of stowing it in the comparatively restricted space remaining behind the engine. With the standard Rotol gear box fitted aft of the engine in the usual manner, there is little enough room left in which to house the undercarriage, and a somewhat unique method of retraction is inevitable. The diagram of an inboard engine on p. 617 illustrates what is, perhaps, the only reasonable and at the same time practical arrangement.

Retraction is electrical, through a small enclosed worm-reduction gear, driven by a motor mounted on the undercarriage support structure. Retraction time would be something like 30 seconds.

Interchangeability

There is some difficulty in providing ready interchangeability, particularly with regard to the inboard nacelle, where the close proximity of the undercarriage to the rear of the engine would appear to impose some limitation of movement. Doubtless a detailed investigation of the proposed slinging arrangements may remedy this, and a scheme similar to that shown, which is a comparatively straightforward application for an outboard nacelle, may be found practicable at the inboard station. Clearly, with an inboard nacelle it would be difficult, if not impossible, to remove the cowling piecemeal with the engine in the manner shown, again on account of the undercarriage.

While admitting the ideological simplicity of the sketch, the process of removing the power plant by the method shown should hardly be beyond achievement. The four telescopic arms of the trolley are intended to engage, by means of substantial horizontal bolts, with suitable bearings within the cowling, which bearings would extend horizontally from the base of the engine mounting and from a point in the immediate vicinity of the engine feet.

From the foregoing there emerge a number of points worthy of note, though the reader must realise that the scheme is offered essentially as a basis of development from which to proceed to finality. The critic may readily detect snags, but I contend that most, or all, of these can be circumvented without departing from the fundamental layout. For instance, the aerodynamic experts may disagree with the idea of the radiator duct discharging through the upper surface of the wing. Very well; then why not consider the nacelle as a pressure cowling? There is no reason at all why the duct aft of the radiator should not be dispensed with and the exit air allowed to circulate round the engine and finally discharged through a flap on the underside of the nacelle.

Another criticism may concern the airscrew being too close to the wing leading edge. A further extension of the reduction gear casing, a by no means prohibitive measure, would promptly remedy this. There should be little objection to an airscrew situated in front of the wing by an amount equal to 17 per cent. of its chord, which is little more than as shown.

Less important, though not to be overlooked, is the

Although not shown in this sketch, a nosewheel would be necessary with the undercarriage so far back.

fact that the undercarriage, by virtue of its position relative to the wing, compels the use of a nose wheel, and a tricycle undercarriage is inevitable.

Against these criticisms, however, there are important claims to be considered, not least of which are those concerning the previously mentioned weight economy. It is expected that a saving in weight of no less than 200 lb. per nacelle is to be achieved. This will be effected by the elimination of the intermediate structure, which on the Lancaster must weigh something like 90 lb., and also by the reduction in the number and weight of cowling panels. This will be better understood from the diagram.

It will be observed that there is no bulkhead accommodation shown on the general arrangement drawings. Instead of the usual arrangement of bulkhead situated immediately behind the engine, it is proposed to incorporate all bulkhead fittings on the two wing ribs directly adjacent to the nacelle, where they will be easy of access from the top of the wing.

Finally, there is a major structural advantage arising from the complete elimination of any overhang between the engine C.G. and the wing spars. This will appreciably reduce twisting moments about the spar, and the C.G. of the nacelle being practically coincident, in the fore-and-aft location, with the C.G. of the entire aircraft will offer a direct contribution to its fore and aft stability.

R.A.F. Master Bombers

Single Mind Control Technicians : First Used Against Mohne and Eder Dams : Pathfinders Planned Peenemunde Attack

WHEN R.A.F. bomber crews selected for the famous attack on the Mohne and Eder dams were undergoing their special training, it was found that this difficult "mining" operation would have to be controlled by a single mind if the pre-arranged plan was to be carried through without risk of mistakes.

But the idea of employing this technique in a normal bombing attack was not conceived until, late in 1943, Bomber Command was given the task of attacking the German "V" weapon experimental centre at Peenemunde, in the Baltic. This was the first bombing attack on a single, small group of buildings to be attempted after the main bombing offensive had begun, and since its complete success was so important to the defence of Britain, it was proposed to concentrate no less than 1,500 tons on this small area—as great a weight of bombs as was normally being used at that time for a major attack on an industrial city.

As in the case of mining the dams, there had to be no risk of mistakes, and so the "single mind" method of controlling the attack was again decided upon, and to make quite sure, a "rehearsal" of the system as applied to normal bombing was carried out in a raid on Turin, which was a comparatively undefended target. Nowadays a "master bomber" controls and directs most of the R.A.F.'s attacks on targets in Germany, from incendiary attacks on large industrial towns to 12,000 lb. bomb precision attacks on canal embankments.

To ensure accuracy of aim, the master bomber, always one of the most experienced pilots in Bomber Command, guides the main force in daylight or night attacks, and in all weathers. He has the responsibility, in attacks made in close support of the Army, of seeing that all bombs fall ahead of the bombing line, and of ensuring such dense concentration of attack as obliterated tactical targets like the strongly fortified towns of Duren and Julich.

Checking P.F.F.

The master bomber's first task is to check the position of the target indicators dropped by the Pathfinder Force, going down low over the target to do so. If the markers are in the right place, he then calls in the main force to bomb. But if the markers have overshot or undershot, he does not allow bombing to begin until the error has been corrected. But target indicators have often to be relaid during an attack, in which case the master bomber must repeat his work, and go down low again to make a further check of the new target indictator's position.

The main bombing force is as much under his control as warships in a naval engagement are under the control of the flagship, and his responsibility is as great as that of a Commander in the field.

If necessary, as in attacks on targets in France when the weather deteriorates and civilian lives might be endangered by inaccurate bombing, the master bomber calls off the attack.

He also observes the weather carefully, paying particular attention to the height of the cloud base, so that he may decide from what height the main attack is to be made. A deputy master bomber is always ready to take the master bomber's place at a second's notice.

The new tactics greatly improved as time went on, and there is little doubt that but for these new tactics and the courage and skill of the master bombers—Wing Commander G. L. Cheshire, V.C., D.S.O., and two bars, D.F.C., was one of them—the tactical bombing which prepared the way for the invasion would have been a much longer and more uncertain business.

Area Attacks

As the campaign developed, master bombers began to operate over German targets. They also controlled and directed area attacks on German industrial cities. They ensured that the loads of incendiaries were evenly distributed over the whole area, and so caused the maximum destruction, for such area attacks require at least as much accuracy and calculation as precision attacks on single factories.

To secure the even distribution of attack is a comparatively new task for the master bomber, and one which taxes all his skill and judgment. But it is mainly due to this new method that forces of about 250 heavy bombers have been able this summer and autumn to devastate as large areas as were destroyed last year by much bigger forces.

It was the Pathfinder Group commanded by Air Vice-Marshal D. C. T. Bennett which devised and perfected this "master bomber" technique. It was they who worked out the plans for the Peenemunde attack, when the master bomber was Group Capt. J. H. Searby, D.S.O., D.F.C., and his deputy master bomber Air Comdre. J. E. Fauquier, D.S.O. and Bar, D.F.C., who was later chosen as master bomber for an attack on Berlin.

There is now a special school for master bombers run by the Pathfinder Force, and each candidate is severely tested before he is allowed to control an attack over an enemy target, taking part in a great many "rehearsals" by night as well as in daylight. Complete attacks, with the dropping of target indicators, are staged for instructional purposes, and the pupils are drawn from the most experienced pilots in the Pathfinder force.

Some months ago a large force of Lancasters and Halifaxes were attacking a marshalling yard near Paris when a voice on the radio telephone said, "Close bomb doors and return home." Nobody paid any attention.

It was an ingenious but not very imaginative attempt by the enemy to interfere by posing as a master bomber, but such a move had been anticipated and the "ghost voice" went unheeded.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

THIS IS TEST FLYING

Was It a Leg-pull?

MY opinion—for what it is worth—on the article, "This is Test Flying," in your issue dated November 9th, only endorses Mr. L. B. Greensted's letter to you in your issue of the 23rd instant.

I do, however, suspect the author of having his tongue in his cheek.

L. S. ASH.

More Professional Observations

I CONFESS to suffering a slight hotness round the collar when reading the article on test flying in the issue of November 9th, but I don't think that this particular effort deserved all the implied criticism in Mr. Greensted's amusingly ironic letter of November 23rd.

On reading through the article again, I see that the writer *did* apologise first for any embarrassment he expected to cause among any professional test pilots who might read it; the description was of a "bad" rather than of a "normal" half-hour in a pilot's life; and the cloud base was, as I understand it, given as 4,000ft., with a broken layer at 1,200ft.—not abnormally difficult conditions for a "straight" production test.

After sufficiently long experience with a comparatively simple type, this can, in fact, be put through its paces with almost clockwork precision after an initial fly-round to see that there is nothing radically wrong. Mr. Greensted himself must know of at least one factory where the more experienced members of the team habitually continue their work in weather which couldn't be considered by any newcomer to the business. They have the routine so "britched up" with long practice that, within reason, weather doesn't affect it. Presumably the object of these periodic dicings is not so much that of merely keeping up production as of encouraging the workers and of "showing willing." Prunish behaviour, no doubt, but any production manager will agree that a little bad-weather testing does wonders in keeping the chaps on their toes in the factory. We all do it, from time to time and for one reason or another—mainly pride, I suppose.

Because I won't risk having my leg pulled, I propose to hide behind a pseudonym. Why not—

"ANOTHER OF THEM"?

TO-MORROW'S LIGHT AIRCRAFT

And Some Observations on Faulty Expression

IN seeking to refute "Indicator's" claim (*Flight*, October 19th) that light aircraft endowed with cabins too closely resembling saloon cars are apt to give the "half-trained amateur" a false sense of security, your correspondent, J. S. Pole (*Flight*, November 9th), draws an analogy between flying and motoring. As *Flight* has more than once pointed out, there is very little in common between these two means of travel, and thus Mr. Pole weakens, rather than helps, his argument.

The road vehicle, be it primitive cyclecar or modern saloon, operates on the solid earth, where he who drives very slowly may be a nuisance to others, but very rarely a danger. The light aircraft operates in the fluid, unstable medium of the air, where he who flies too slowly courts disaster, but whose *necessary* skill calls for accurate judgment, particularly near the ground.

It certainly seems a sound argument, therefore, that if you make the pilot of limited skill and experience *feel* he is as safe in his little aircraft as he was in his saloon car (by surrounding him with car-like furnishings) you will inculcate a false sense of security, than which few things are more dangerous. The skilled and experienced pilot, whether amateur or paid, will not fall into any such trap; he *knows* the difference.

Possibly part of the trouble is that "Indicator" has committed the all-too-common error of saying "amateur" when he really meant novice, or tyro, though I am not at all sure which way Mr. Pole interprets the word "amateur" when he says, "We don't have amateur motorists." We most certainly have novice motorists (unfortunately!), and he will agree that many of our best competition drivers have been amateurs—Tim Birkin, for instance.

Which rather makes me wonder just how many arguments in correspondence columns in general spring from imperfect understanding caused by faulty expression.

Not so long ago a contributor to *Flight* said, "the few accidents in R.A.F. training are due to the discipline" (I quote from memory), which, at first glance, seemed to suggest that the discipline was to blame for what few accidents did occur. What he meant, of course, was that the fewness of accidents in R.A.F. training was due to the discipline.

Come, come, gentlemen, let us treat our noble tongue with more respect!

"REALIST."

TAKE-OFF TACTICS

Shorter Run with Tailwheel Down?

AN argument has been taking place in the wardroom of one of H.M. aircraft carriers as to whether it is possible to shorten the take-off run of a conventional aircraft by pulling it off main wheels first, leaving the tail wheel in contact with the deck.

Assuming that the stalling incidence is greater than the wing incidence of the aircraft when in the ground attitude (i.e., all three wheels on the ground) then the weight of the aircraft can be equalled by the wing lift at a lower speed if the incidence of the wings can be increased. Pilots say that they get the impression that they can reduce the take-off run (by getting airborne at a lower speed) by taking off main wheels first.

But as the main wheels have to be lifted off the ground by the wing lift, it would appear that this can only be done when sufficient speed has been reached for the wing lift to equal the aircraft weight in the ground attitude. And so, by holding the tail down after the main wheels have lifted, the pilot is actually increasing the take-off run, as he could have become completely airborne at the instant when his main wheels first left the deck.

Can any of your readers settle this argument for us?

"ALL AT SEA."

AIRCRAFT ENGINEERING TRAINING

A Reply to Mr. Ashley from India

FURTHER to the correspondence on the subject of aircraft engineering training. In his letter (*Flight*, August 3rd) Mr. Ashley states that the R.A.F. tradesman at his best is but semi-skilled. As a reason for this sweeping statement he quotes his impressions gained whilst in conversation with a corporal fitter, his own experiences at Halton, and certain elements of knowledge in which he found himself to be lacking on entering the field of civilian aviation. With regard to the latter I would hasten to say that Mr. Ashley has only himself to blame. Every aircraft apprentice at Halton is taught considerably more than the elementary calculations of flight and structures, and such simple test bed procedure as taking a rated altitude power curve.

What Mr. Ashley appears to have overlooked whilst conversing with the corporal fitter, is that, no doubt, this man was one of the many who have received the highly compressed wartime training; he was taught to do a certain job, viz., maintain aircraft in a serviceable condition regardless of the conditions and restrictions under which he works, and at that particular job he is unsurpassed. The possibilities are that, prior to his enlistment, the corporal had no connections with the aircraft industry and probably none with the engineering trades as a whole. Where he does his job—in the draughty hangar, frozen dispersal point, or steaming jungle strip—he has none of the resources of a big machine shop, much less those of a fully-equipped test bed behind him. He is lucky if he has a 6in. lathe in the workshop's truck. The Technical Training Command, with admirable vision, foresaw these conditions and did not spend any of the dangerously short time at their disposal imparting what would have been, in the circumstances, superfluous knowledge. Instead they gave the wartime pupil sufficient all-round knowledge to cover his lack of experience and technical background and, to incite his interest, to pursue further the vast field before him.

It may surprise Mr. Ashley to know that the Technical Schools which, no doubt, he had the good fortune to attend and which great numbers of just such men as his fitter corporal would attend if they had the chance, do not exist in the Western Desert or even in some of the more remote villages of England where some Air Force stations are found.

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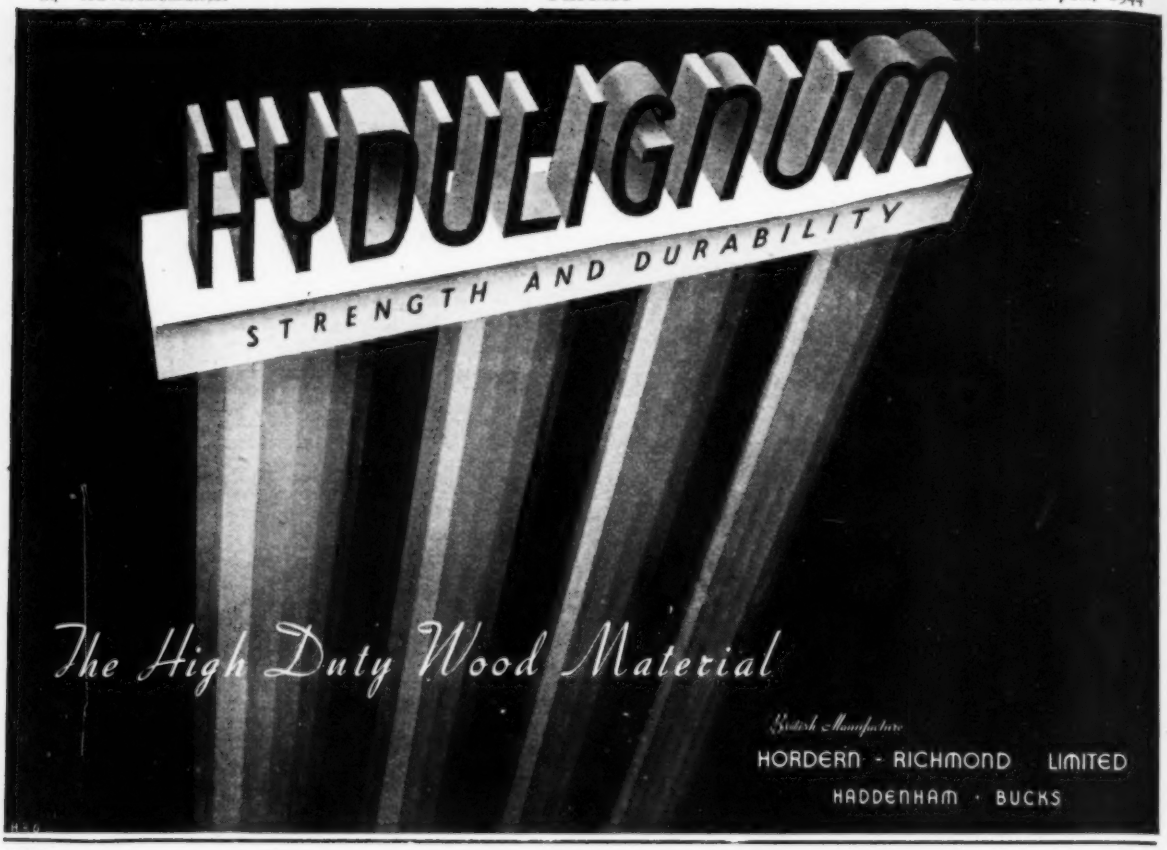

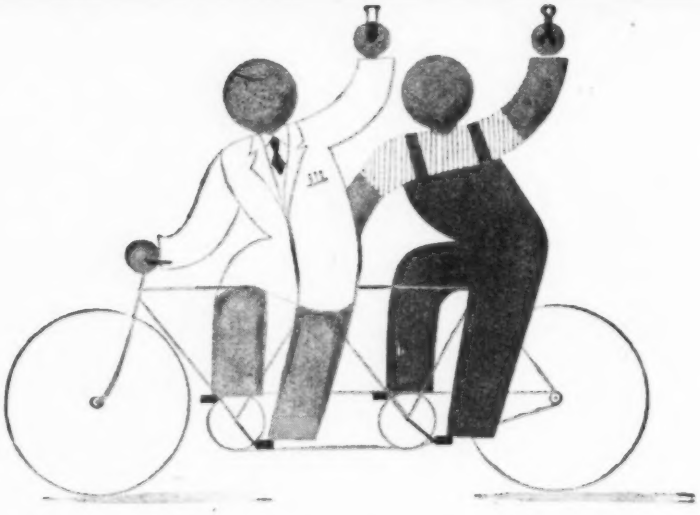

RESEARCH GUIDES PRODUCTION

Somebody thought of it: somebody tested it: somebody made the experimental model: somebody planned its production: and in the end the enemy realised that he was up against another new weapon—made possible because research guides production in the uses of aluminium and its alloys.

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CORRESPONDENCE

Mr. Ashley states that he gained the impression that the airman with whom he conversed did not fully understand the airscrew and what made it turn. Frankly I disbelieve him, or he must have been very hard to please. No man can possibly work on the modern, highly developed, supercharged aircraft engine and constant-speed airscrew, diagnosing and rectifying the myriad, intricate snags that crop up, as a corporal fitter has to do, without being thoroughly conversant with his job and its underlying principles. Over 90 per cent. serviceability was achieved throughout the North African campaign without the aid of elaborate equipment in comfortable surroundings. Hardly the achievement of a semi-skilled body of men. As Mr. Ashley knows well—or should know if he is an engineer—it is when the improvisation and "making do" have to take place that a man's real technical ability and imagination reveal themselves.

If Mr. Ashley would care to venture as far afield as India he would find R.A.F. personnel doing all the work done in an aircraft factory in England equally well and often with considerably less equipment and under conditions hardly as conducive to precision work as exist at home. He may be surprised to learn that many of the repair shops in India have their own tool room, and on the test beds there are men who can use a slide-rule.

With regard to his criticism of the lack of experience in machine-tool work, I would point that there is in the R.A.F. the trade of Machine-Tool Setters and Operators, and men of this calling staff the machine shops and the quality of their work is equal to, and in some cases better than, the machining done in many civilian tool rooms. The R.A.F. training in peacetime included the rudiments of machine-tool work for its fitters also, who were not primarily intended as machinists. Further, as for the bench work, I suggest that Mr. Ashley, when next the opportunity presents itself, examine some of the exhibits at the Engineering Industries Fair turned out by senior apprentices at Halton and the conversion course at Henlow. He will be forced to agree that no civilian apprentice could do better.

The detailed study of specific engine types which your correspondent found so irksome was to give his raw mind the essential foundation in engine design and construction upon which to build his later knowledge gained by experience. This is sound practice, widely adopted, and should benefit anyone with the type of mind which is receptive to new ideas and additional knowledge.

Mr. Ashley might do well to consider how the Service has coped with the enormous expansion in its technical personnel in the last five years. That expansion has taken place around the hard core of Halton and Manston-trained (direct entry) tradesmen.

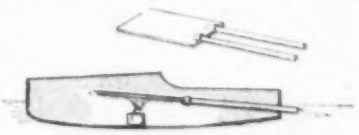
In closing, I might add that having served my apprenticeship in a civilian works specialising in heavy engineering, I am also in a position to make comparisons. Of the two forms of apprenticeship training I infinitely prefer the R.A.F. method and the results it produces. I would further state that I have the most sincere admiration for those men who, torn suddenly from non-technical civilian occupations, have mastered the intricacies of the modern aircraft, and acquired the skill and ability to maintain and repair it, unaided, in remote parts of the world. Of the system that can produce such results, no praise can be too great.

E. J. BOTTOMLEY
(R.A.F., India).

THERE'S NOTHING NEW . . .

"The Pop Boat" from Japan

THERE was an excellent appreciation by one of the Axis partners of the jet propulsion system in a toy boat of more recent times than the 45-years-old example mentioned by Mr. Woodward (page 565, November 23rd). About ten years ago my small boy had a tiny tin speed boat about 5in. long, made in Japan, and called "The Pop Boat." It was sold at most of the toy shops for 1s., complete with a few pieces of candle, which were the fuel.



The "works" was a flat "box" of two springy plates joined together at the edges and from which two very small pipes extended through the transom. When the heat was applied to the "boiler" its two plates or diaphragms bowed out slightly and persumably drew in a spot of water which was flashed into steam and ejected with a hearty "pop," driving the boat gaily with a distinctly realistic sound reminiscent of an outboard engine. Immediately the steam was ejected the boiler cooled, flattened itself in readiness for the next cycle, which was repeated, from memory, at a rate of about 250-300 pops per minute. Quite a good speed was developed.

DONALD H. SMITH.

THE BRISTOL FREIGHTER

Should be a Paying Proposition

THE Bristol Freighter opens up the first gate to a field of speculation that has interested me for some time. The figure of one shilling per ton-mile seems to be a very satisfactory one. A shot at mathematics and a few figures from your excellent paper gives me the following.

A load of 4 tons for 300 miles represents two hours' flying and equals £60 per stage. The economic life of an airframe per year is between 2,000 and 3,000 hours' flying. Therefore, the revenue from an aircraft appears to be £60,000 to £90,000 per annum. If one allows for an initial cost of £1 per gross lb., the same for 12 engines each doing 500 hours, and petrol at 2s. 6d per gallon, the cumulative total of first layout gives £60,000 for a 3,000-hour year. Subtraction gives £30,000 for upkeep, tyres, landing fees, etc., in order that the initial cost may be defrayed within the year.

But here, one gathers, are some of the debit items. This flying time involves 1,500 landings, each with a substantial landing fee, a period of at least half an hour for refuelling at the stops, or an hour's hard work loading or unloading by that gantry in the nose, which totals 1,500 hours' time away from profit or servicing. But there will still be one day in two (in idleness out of the sky) for the activities of the ground engineers.

I deduce that a sum of £10,000 will cover the aircrew and the landing fees, and, from all this, that the foreseen cost of air freight in this scheme could turn into a paying proposition provided the initial outlay of money and machines can be guaranteed. It makes one wonder why there are still critics who carp at the big companies starting post-war companies with a decent-sized fleet of aircraft and ready cash for the makers. It makes one wonder, also, at the need for so much Government subsidy to cover non-profit-earning companies. But then my figures must be wrong, or it would be too easy.

NIGEL WALKER.

BOOK REVIEWS

Burton's Four-Figure Navigational Tables. By S. M. Burton and Gilbert F. Cunningham, B.A. Burton's Navigational Publications, Ltd. 11s. 6d.

CONTAINING in its 120 pages everything that the air navigator is likely to want, this book has been designed to meet the need for a set of four-figure tables providing an ample degree of accuracy and yet being less bulky and complicated than the standard volumes of five-figure tables designed for marine work. Moreover, the reduction in the number of pages and figures makes for much faster working and less chance of error.

Astro-navigation in the air is, of course, usually carried out by means of official pre-computed tables or by astrograph, but all advanced students have to master the mathematical method. There are also navigational problems to be solved on the ground for which tables are necessary. Notes on the tables are included, which give instructions for use and some helpful examples of various problems.

Wings Over Burma. By Kenneth Hemingway. Quality Press, 15s. net.

THIS book concerns a Hurricane squadron (No. 17) in Burma before the Japanese advanced. In the early chapters the squadron was stationed near Rangoon. Then they had to move back, and their landing strips were heavily bombed by the enemy. They began to run short of machines and spares, though the ground crews did wonders in keeping a few serviceable. Next, having mustered a few more Hurricanes they started off up the Burma Road, hoping to work with the A.V.G. in China. Again difficulties of supply defeated them, and finally the squadron moved back to . . . somewhere.

There are some accounts of air combats, but the book is mainly a lively picture of squadron life and the unquenchable thirst of Burma. The author has learnt one Hindustani word, *char*, meaning tea, which was the main, though not the only thirst-quencher. The strong *esprit de corps* of the squadron is the main theme of the book.

Portrait of an Avro Lancaster III with Rolls-Royce Merlin XXVIII engines.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

Army Air Corps

Appointment

Field-Marshal Sir BERNARD MONTGOMERY, K.C.B., D.S.O., late the Royal Warwickshire Regiment, is appointed Colonel Commandant (Parachute Regiment).

Royal Air Force

Promotion

GENERAL DUTIES BRANCH.

Air Comdre. (temp.) (Act. Air Vice-Marshal) V. E. GROOM, O.B.E., D.F.C., is granted the rank of Air Commodore (war subs.), September 8th, 1944.

Appointments

THE Air Ministry announces the following appointments:—

Air Comdre. F. N. TRINDER, C.B.E., to Special Duty List, Air Ministry Unit (Equipment Duties).

Air Comdre. E. J. KINGSTON-McCLOUGHRY, C.B.E., D.S.O., D.F.C., to be R.A.F. representative Government of India Defence Committee.

Act. Air Comdre. J. L. KIRBY, C.B.E., to be Senior Air Staff Officer of a Group in Bomber Command.

Act. Air Comdre. J. A. EASTON to be Deputy A.C.A.S. (I), Air Ministry.

Group Capt. R. E. DE TREVIERES VINTRAS to be Director of Intelligence, A.C.A.S. (I), and to be Air Commodore.

Group Capt. C. D. ADAMS, O.B.E., to command a base in Bomber Command, and to be Act. Air Commodore.

Group Capt. C. B. WINCOTT to Ministry of Production (as Director of Production, Canadian and American) and to be Act. Air Commodore.

Group Capt. R. N. WAITE to Special Duty List (Air Staff Code and Cypher Duties) and to be Act. Air Commodore.

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following award:—

For outstanding courage, skill and determination in minelaying operations in enemy waters:

Bar to Distinguished Service Cross

Act. Lt. Cdr. (A) R. D. HEAD, D.S.C., R.N.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

Distinguished Service Order

Flt. Lt. B. H. BOTHA, D.F.C., R.A.F.V.R., No. 50 Sqn.—Flt. Lt. Botha has a notable record of operations. He has completed a very large number of sorties, both as an air gunner and pilot, against many heavily defended targets in Germany. He has at all times displayed great determination and courage in pressing home his attacks and has undoubtedly assisted in maintaining the high standard of morale in his squadron.

Act. Flt. Lt. B. W. CLAYTON, D.F.C., C.G.M., R.A.F.V.R., No. 617 Sqn.—Flt. Lt. Clayton has completed a large number of sorties as captain of aircraft. Throughout he has displayed courage, devotion to duty and gallantry of a very high order. His successes have been proved by the many excellent photographs he has obtained.

Act. Flt. Lt. R. S. D. KEARNS, D.F.C., D.F.M., R.N.Z.A.F., No. 617 Sqn.—Throughout a long tour of operational duty Flt. Lt. Kearns has displayed exceptional determination and courage. Since the award of the D.F.C. he has completed very many sorties against heavily defended objectives in Germany. His consistent good work has resulted in much damage to the enemy and his skill and leadership have been an inspiration to all.

Sqn. Ldr. G. B. ELLWOOD, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—This officer has participated in a very large number of sorties, including seven against the German capital. He is a brave and devoted member of aircraft crew and has rendered service of immense value. In addition to his operational duties, Sqn. Ldr. Ellwood has devoted much of his knowledge and energy in the training of other members of the squadron.

Sqn. Ldr. L. L. MACKINNON, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—This officer has completed a second tour of operational duty, during which he has successfully attacked a variety of targets, many of them in Northern France. He is an outstanding pilot, a dauntless captain and an inspiring leader. His example has been well illustrated in the fine fighting spirit of the squadron.

Sqn. Ldr. G. A. SWEANY, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—Sqn. Ldr. Sweany has participated in a very large number of sorties against well defended targets. Throughout he has displayed outstanding keenness and has been unsparing in his efforts to attack the enemy on every possible occasion. He is a highly efficient air bomber whose excellent work has contributed materially to the successes obtained.

Act. Sqn. Ldr. E. V. SMITH, D.F.C., R.A.F.V.R., No. 109 Sqn.—Since being awarded the D.F.C., Sqn. Ldr. Smith has completed very many sorties against a wide range of enemy targets. His keenness and determination have been of the highest standard and his successes are an excellent tribute to the accuracy of his attacks. His achievements have been worthy of high praise.

Act. Sqn. Ldr. D. H. HAMMOND, D.F.C., R.N.Z.A.F., No. 489 (N.Z.) Sqn.—Sqn. Ldr. Hammond has taken part in numerous attacks on enemy shipping and has displayed a high degree of courage and determination throughout. In July, 1944, he led a formation of aircraft in an attack on an enemy convoy off the Norwegian coast. During the operation, Sqn. Ldr. Hammond obtained a hit on a medium-sized vessel causing its destruction. This officer has set a fine example. His efforts are untiring and his devotion to duty unfailing.

Act. Sqn. Ldr. D. F. WESTENRA, D.F.C., No. 65 Sqn.—Since being awarded the D.F.C., this officer has completed very many sorties, including attacks on enemy transport and troop concentrations in the Normandy theatre. He is a relentless fighter whose great skill and gallant example have greatly inspired the squadron he commands. Sqn. Ldr. Westenra has destroyed nine enemy aircraft.

Flt. Lt. K. L. CHARNEY, D.F.C., R.A.F.V.R., No. 602 Sqn.—Flt. Lt. Charney is a brave and resourceful fighter. He has taken part in a very large number of sorties, involving a variety of operational missions. In air fighting he has destroyed six enemy aircraft.

Flt. Lt. R. W. TURKINGTON, D.F.C., R.A.F.V.R., No. 241 Sqn.—This officer has set a fine example of skill, determination and devotion to duty. He has completed a large number of sorties and much of the success achieved by the squadron can be attributed to this officer's efficiency and resolution. During a sortie in July he destroyed one and probably destroyed a second enemy aircraft, although only one cannon was functioning in his aircraft. Flt. Lt. Turkington is a gallant and inspiring flight commander.

Act. Sqn. Ldr. W. A. DOUGLAS, D.F.C., A.A.F., No. 611 Sqn.—This officer has completed a very large number of sorties, including numerous attacks on enemy shipping. In recent air operations, Sqn. Ldr. Douglas has led the squadron in many sorties over the Normandy beaches. On one occasion he attacked a Ju 88. Although his gun sight was faulty, Sqn. Ldr. Douglas pressed home his attack from close range. His bullets struck the enemy aircraft, which exploded in the air. Although his own aircraft was damaged by flying debris, Sqn. Ldr. Douglas flew safely to base. His devotion to duty has been unfailing.

Sqn. Ldr. N. A. KYNASTON, D.F.C., R.A.F.V.R., No. 91 Sqn.—Sqn. Ldr. Kynaston has been in command of his squadron since August, 1943. He has completed a large number of sorties and his excellent leadership and fine fighting spirit have contributed in no small way to the exceptional

record of his squadron. He has destroyed 17 flying bombs.

Act. Sqn. Ldr. R. J. McNAIR, D.F.C., R.A.F.V.R., No. 247 Sqn.—Since the award of the D.F.C., Sqn. Ldr. McNair has completed very many sorties, involving attacks on a wide range of targets. In July, 1944, while leading his squadron on an armed reconnaissance over Northern France, his aircraft was hit by anti-aircraft fire. A few minutes later the engine became useless. Displaying great coolness and skill, Sqn. Ldr. McNair glided his aircraft over the enemy lines amidst a barrage of fire from the enemy's ground defences and completed a successful landing in a field. This officer has at all times shown courage, tenacity and skill in attacking the enemy. His keenness and fine leadership have been responsible for the high morale of his squadron.

Act. Sqn. Ldr. G. D. NORTH-LEWIS, D.F.C., R.A.F., No. 181 Sqn.—As squadron commander, this officer has at all times led his squadron with great coolness, courage and tenacity. During August, 1944, when on an armed reconnaissance over an area in Northern France, he sighted an enemy tank force and immediately led his squadron in to the attack. His aircraft was repeatedly hit by anti-aircraft fire. Undeterred, Sqn. Ldr. North-Lewis pressed home his attack with skill and determination. His splendid example and leadership are an inspiration to all in his squadron.

Wing Cdr. G. D. SISE, D.S.O., D.F.C., R.N.Z.A.F., No. 248 Sqn.—Within recent weeks, Wing Cdr. Sise has participated in a number of sorties during which several enemy ships of varying type have been sunk and others damaged. Much of the success achieved can be attributed to this officer's great skill, inspiring leadership and great determination.

Second Bar to Distinguished Flying Cross

Act. Sqn. Ldr. H. B. MARTIN, D.S.O., D.F.C., R.A.F.V.R., No. 515 Sqn.—During his operational tour, Sqn. Ldr. Martin has destroyed two enemy aircraft and damaged a third. In May, 1944, his aircraft was detailed to attack a target on Kiel Canal. The operation was completed with great success. Again, in June, 1944, Sqn. Ldr. Martin participated in the complete destruction of four enemy vehicles by cannon fire close to the invasion area. On other occasions he has attacked enemy airfields despite severe opposition. As Flight Commander, the sterling and audacious operational work achieved by this officer, combined with his ardent fighting spirit, is worthy of the highest praise.

F/O. A. A. O'LEARY, D.F.C., D.F.M., R.A.F., No. 239 Sqn.—This officer has completed many operational flights and has participated in the destruction of four enemy aircraft. His exceptional ability as a navigator, determination and cheerful confidence in times of stress have set an excellent example to all.

Bar to Distinguished Flying Cross

Act. Sqn. Ldr. L. G. JOHNSON, D.F.C., R.A.F.V.R.—Sqn. Ldr. Johnson has completed numerous successful sorties against the most heavily defended targets. His outstanding ability and fine record of achievement have set a sterling example to all.

Act. Sqn. Ldr. D. H. S. KAY, D.F.C., R.A.F.O., No. 109 Sqn.—Sqn. Ldr. Kay has completed many successful sorties, including attacks on heavily defended targets in the Ruhr. He has proved himself to be a most reliable captain whose high sense of devotion to duty and skill as a pilot are worthy of the highest praise.

Act. Sqn. Ldr. N. W. MACKENZIE, D.F.C., R.A.F.V.R., No. 627 Sqn.—Sqn. Ldr. Mackenzie has taken part in a large number of operational sorties, which have included attacks against targets located in the most heavily defended areas of Germany. He has continued to operate with keenness and courage and, since being awarded the D.F.C., has completed many more sorties. On two occasions he has remained in a most strongly defended target area during the whole period of attack by the main force for the purpose of making a cinematographic record. Throughout a long and arduous operational career Sqn. Ldr. MacKenzie has had a fine record of sustained gallantry and devotion to duty.

Act. Sqn. Ldr. E. F. NELLES, D.F.C., R.A.F.V.R., No. 627 Sqn.—Throughout a long and successful tour of operations, Sqn. Ldr. Nelles has consistently shown an unflinching determination to bring each sortie to a successful conclusion, and his enthusiasm has set a splendid example to the whole squadron. He has now completed an operational tour of high merit and devotion to duty which is most commendable.

Act. Sqn. Ldr. C. D. RASH, D.F.C., R.A.F.V.R., No. 115 Sqn.—Sqn. Ldr. Rash has just completed his second successful tour of operations. His great determination, cheerful confidence and outstanding skill as pilot, combined with his splendid record, have won the admiration of all his officers and airmen.

Act. Sqn. Ldr. W. J. REES, D.F.C., R.A.F.V.R., No. 139 Sqn.—This officer has completed numerous successful sorties since the award of the D.F.C. The majority of these have been completed against the major German targets, and they have included many attacks on Berlin. During one of these, his aircraft was illuminated by searchlights while over the target and subjected to intense and accurate anti-aircraft fire, which did serious damage, putting one engine out of action. Despite this, Sqn. Ldr. Rees completed his mission with success and made a safe landing in the United Kingdom. He has at all times shown the utmost courage and devotion to duty.

Act. Sqn. Ldr. F. G. RUMBLES, D.F.C., R.A.F.V.R., No. 617 Sqn.—This officer has been engaged in operational duties for a very long period. In the face of great hazards and many difficulties he has completed many important and responsible tasks, often remaining over heavily defended targets for long periods in the face of intense opposition. His devotion to duty has, at all times, been most praiseworthy.

Act. Sqn. Ldr. A. W. ELLER, D.F.C., R.A.F.V.R., No. 18 Sqn.—This officer has acted as flight commander throughout his second tour of operational duty. Sqn. Ldr. Eller has taken part in many night reconnaissances of road networks in mountainous country, which have demanded a high degree of skill and courage. His fine fighting spirit and determination have been a source of inspiration to all in the squadron.

Act. Sqn. Ldr. F. W. WALTON, D.F.C., R.A.F.V.R., No. 109 Sqn.—This captain of aircraft has completed a large number of successful operations since the award of the D.F.C. He is a most experienced pilot, always keen to fly against the enemy, and pressing home his attacks with skill and determination.

Act. Sqn. Ldr. W. J. J. WELCH, D.F.C., R.A.F., No. 77 Sqn.—Sqn. Ldr. Welch has nearly completed his second tour of operational flying. Throughout his successful tours he has set a splendid example of skilful pilotage, cool judgment and determination which have been an inspiration to his squadron. His leadership has also been of a very high order and worthy of the highest praise.

Flt. Lt. E. B. CHANDLER, D.F.C., R.A.F.V.R., No. 617 Sqn.—Since the award of the D.F.C., Flt. Lt. Chandler has completed a further operational tour, during which he has attacked most of the major German targets. He has returned from operations on more than one occasion on one engine, and once spent eight days in a dinghy in the North Sea. Despite these hardships, his courage and fine fighting spirit have never wavered. His devotion to duty has been outstanding throughout all his operations.

Flt. Lt. D. W. GRIFFITHS, D.F.C., R.A.F.V.R., No. 139 Sqn.—Flt. Lt. Griffiths is an outstanding officer. The fine results he has frequently obtained have been, in many instances, confirmed by excellent photographs. His courage and determination have always been of a very high order.

Flt. Lt. J. R. GOODMAN, D.F.C., R.A.F.V.R., No. 627 Sqn.—Since the award of the D.F.C., Flt. Lt. Goodman has continued to operate in a highly skilled and courageous manner. During many of his sorties he has met with heavy opposition, but despite this he has completed his task.

Flt. Lt. R. HARTLEY, D.F.C., R.A.F.V.R., No. 109 Sqn.—This officer has completed a number of operations since the award of the D.F.C. His duties have called for a very high degree of skill and accuracy and he has encountered very severe opposition on many of his flights. Flt. Lt. Hartley has always displayed courage of the highest order.

Flt. Lt. A. J. L. HICKOX, D.F.C., R.A.F.V.R., No. 627 Sqn.—During his long and successful record of operations, Flt. Lt. Hickox has attacked many of the most strongly defended targets in Germany, and on numerous occasions his aircraft has been heavily engaged by enemy defences. He has recently undertaken many hazardous sorties and has consistently displayed great ability and skill. His imperturbable coolness in dangerous situations has been highly commendable.

Flt. Lt. J. H. KENNY, D.F.C., R.A.F., No. 139 Sqn.—Flt. Lt. Kenny is an outstanding officer, who has always shown the utmost keenness to operate against the enemy. He has always shown courage and tenacity in the face of enemy opposition. His experience has been invaluable in the training of new crews.

Flt. Lt. N. LEWIS, D.F.C., R.A.F., No. 627 Sqn.—Flt. Lt. Lewis is a navigator with a fine operational record. Since being awarded the D.F.C. he has participated in many more operational sorties, the majority of which have been against heavily defended targets in Germany. The high standard of navigation displayed in action has enabled many missions to be successfully completed.

Flt. Lt. W. E. MCALPINE, D.F.C., R.A.F.V.R., No. 75 (N.Z.) Sqn.—Since being awarded the D.F.C., this officer has participated in many more operational sorties during which he has displayed outstanding ability as a leader and continued devotion to duty. During a recent operation, after setting course, the rear turret of his aircraft became unserviceable, but despite this the target was bombed successfully.

Flt. Lt. G. R. ROSS, D.F.C., R.A.F.V.R., No. 625 Sqn.—Flt. Lt. Ross has continued to show, during many operational missions, the high order of courage and determination which earned him outstanding success before the award of the D.F.C. He has always pressed home his attacks despite the heaviest opposition, and even when his aircraft has sustained severe damage from anti-aircraft fire he has continued steadily on his mission. On numerous occasions, this officer has secured excellent photographs of the target area.

Act. Flt. Lt. R. C. BROOKER, D.F.C., R.A.F.V.R., No. 35 Sqn.—Since the award of the D.F.C., Flt. Lt. Brooker has completed further successful operational sorties. He has shown great accuracy and reliability in his missions, gaining the complete confidence of his crew and setting a high standard of duty which has been a valuable asset to his squadron. The consistent skill and determination of this officer is worthy of high praise.

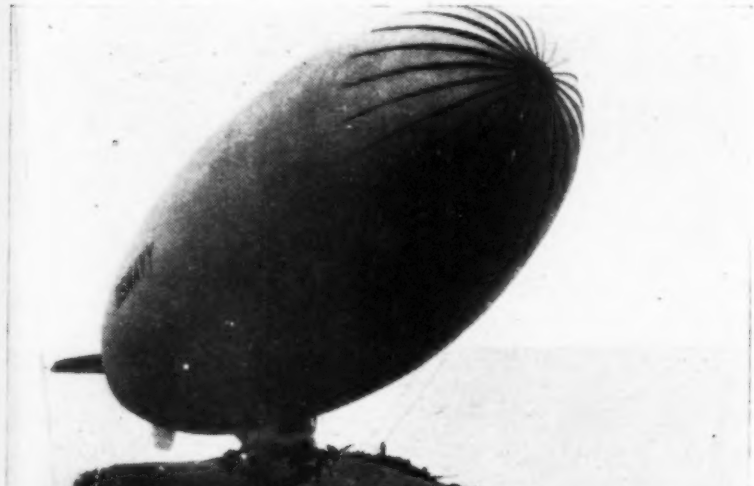
Act. Flt. Lt. C. L. FRENCH, D.F.C., R.A.F.V.R., No. 105 Sqn.—Flt. Lt. French has completed two tours of duty, operating both in the Middle East and the United Kingdom. Throughout all these operations he has shown himself to possess courage and fortitude of the highest order, and has maintained a notable standard of skill and reliability.

Act. Flt. Lt. W. E. G. HUMPHREY, D.F.C., R.A.F.V.R., No. 105 Sqn.—Since his previous award, Flt. Lt. Humphrey has completed numerous successful sorties, many of which were accomplished in daylight at low level. He has consistently displayed great courage and determination in hazardous circumstances and his steady devotion to duty has been an inspiration to all.

Act. Flt. Lt. J. MOSSOP, D.F.C., D.F.M., R.A.F.V.R., No. 35 Sqn.—Flt. Lt. Mossop has completed a very large number of operational sorties. He has proved himself to be an ideal leader. His skill, courage and determination to reach his objective have contributed very largely to the fine record of success achieved by his crew and the excellent photographic evidence obtained.

F/O. H. C. BOYD, D.F.C., R.A.F.V.R., No. 100 Sqn.—Since the award of the D.F.C., F/O. Boyd has participated in many sorties. He has shown a high degree of navigational skill and accuracy. A courageous and reliable navigator, this officer has a fine record of operational success.

F/O. R. COOPER, D.F.C., R.A.F.V.R., No. 101 Sqn.—This officer has completed a second tour of operational duty since the award of the D.F.C. He is an extremely capable and efficient navigator. His work has called for courage and endurance of a high order and has been of the greatest value, his skill at his exacting task has earned him a high reputation for accuracy and reliability.



U.S. GAS BAG: An American Naval patrol-airship landing on the deck of an aircraft carrier.

RETURN TO "A 2" LIBRARY

Distinguished Flying Cross

Wing Cdr. R. T. F. Gates, A.F.C., R.A.F., No. 53 Sqn.
F/O. D. A. Little, R.A.A.F., No. 461 (R.A.A.F.) Sqn.
P/O. I. F. Southall, R.A.A.F., No. 461 (R.A.A.F.) Sqn.
Wing Cdr. J. D. Nelson, R.A.F., No. 12 Sqn.
Flt. Lt. M. H. Parry, A.F.C., R.A.F.V.R., No. 106 Sqn.
Flt. Lt. P. Ainley, R.A.F.V.R., No. 57 Sqn.
F/O. H. Davies, R.A.F.V.R., No. 10 Sqn.
F/O. A. C. MacKellar, R.A.F.V.R., No. 57 Sqn.
F/O. H. H. Osborn, R.A.F.V.R., No. 455 (R.C.A.F.) Sqn.
F/O. S. J. Sykes, R.A.A.F., No. 455 (R.A.A.F.) Sqn.
F/O. D. Whishaw, R.A.A.F., No. 453 (R.A.A.F.) Sqn.
Wing Cdr. J. A. Sproule, No. 48 Sqn.
Sqn. Ldr. J. D. Somerville, R.C.A.F., No. 410 (R.C.A.F.) Sqn.
F/O. G. D. Robinson, R.C.A.F., No. 410 (R.C.A.F.) Sqn.
Sqn. Ldr. R. A. Reece, D.F.M., R.A.F.
Flt. Lt. G. W. Johnson, R.C.A.F., No. 401 (R.C.A.F.) Sqn.
Flt. Lt. P. O. Miles, R.A.F.V.R., No. 16 Sqn.
Flt. Lt. J. O. Mathews, R.A.F.V.R., No. 157 Sqn.
W/O. A. Penrose, R.A.F., No. 157 Sqn.
Flt. Lt. J. E. Mitchell, R.A.F.V.R., No. 164 Sqn.
Flt. Lt. A. E. Napier, R.A.F.V.R., No. 164 Sqn.
Flt. Lt. J. C. Scott, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
F/O. T. H. McGovern, R.A.A.F., No. 181 Sqn.
F/O. N. M. Page, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
F/O. R. J. Roe, R.A.F.V.R., No. 487 (N.Z.) Sqn.
F/O. C. R. Wilson, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
F/O. J. H. Cole, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
F/O. D. F. Grant, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
F/O. F. C. Pope, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
F/O. G. A. Sargant, R.A.A.F., No. 466 (R.A.A.F.) Sqn.
P/O. N. J. Scott, R.N.Z.A.F., No. 175 Sqn.
Sqn. Ldr. F. J. A. Chase, R.A.F.V.R., No. 264 Sqn.
F/O. A. F. Watson, R.A.F.V.R., No. 264 Sqn.
Sqn. Ldr. J. R. Beirnes, No. 438 (R.C.A.F.) Sqn.
Sqn. Ldr. J. D. Browne, R.C.A.F., No. 442 (R.C.A.F.) Sqn.
Major W. P. Stanford, S.A.A.F., No. 7 (S.A.A.F.) Sqn.
Flt. Lt. R. M. Carr, R.A.F.V.R., No. 25 Sqn.
Flt. Lt. K. J. Fiset, R.C.A.F., No. 439 Sqn.
Flt. Lt. W. A. Olmsted, R.C.A.F., No. 442 (R.C.A.F.) Sqn.
Capt. J. H. Conradie, S.A.A.F., No. 253 Sqn.
Capt. S. Pienaar, S.A.A.F., No. 60 (S.A.A.F.) Sqn.
Lt. A. R. Lockhart-Ross, S.A.A.F., No. 60 (S.A.A.F.) Sqn.
F/O. D. W. Goodwin, No. 422 (R.C.A.F.) Sqn.
F/O. P. N. Herbert, R.A.F.V.R.
F/O. J. D. Johnston, R.A.F.V.R., No. 148 Sqn.
F/O. D. C. Laubman, R.C.A.F., No. 412 (R.C.A.F.) Sqn.
F/O. R. D. Mayhill, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
F/O. D. N. Robinson, R.N.Z.A.F., No. 488 (N.Z.) Sqn.
F/O. M. L. Tapp, R.A.A.F., No. 12 Sqn.
Sqn. Ldr. J. F. Easton, R.C.A.F., No. 408 Sqn.
Flt. Lt. I. C. Campbell, R.A.F.V.R., No. 65 Sqn.
Flt. Lt. G. W. Stokes, R.A.F.V.R., No. 15 Sqn.
P/O. S. Freeden, R.A.F.V.R., No. 156 Sqn.
Flt. Lt. A. McK. S. Steedman, R.A.F.V.R., No. 241 Sqn.
Flt. Lt. R. W. Kimpton, R.A.A.F., No. 455 (R.A.A.F.) Sqn.
Capt. W. E. Senn, S.A.A.F., No. 31 (S.A.A.F.) Sqn.
F/O. C. E. Cock, R.A.A.F., No. 455 (R.A.A.F.) Sqn.
P/O. P. Catchpole, R.A.F.V.R., No. 604 Sqn.
F/O. R. Dryland, R.A.F.V.R., No. 3 Sqn.
F/O. L. W. Harding, R.A.F.V.R., No. 166 Sqn.
F/O. J. N. Thompson, R.A.F., No. 415 (R.C.A.F.) Sqn.
F/O. W. C. Freestone, R.A.F.V.R., No. 44 Sqn.
F/O. N. H. Hudson, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
P/O. S. B. McKillop, R.C.A.F., No. 415 (R.C.A.F.) Sqn.
F/O. W. P. Bell, R.N.Z.A.F., No. 620 Sqn.
F/O. D. R. Campbell, R.C.A.F., No. 196 Sqn.
F/O. W. H. Chappell, R.A.F.V.R., No. 190 Sqn.
F/O. W. J. Grey, R.A.F.V.R., No. 125 Sqn.
F/O. A. J. Millar, R.A.F.V.R., No. 125 Sqn.
F/O. A. E. Maloney, R.A.F.V.R., No. 620 Sqn.
F/O. N. E. Streight, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
F/O. W. T. Jennings, R.C.A.F., No. 90 Sqn.
W/O. M. Azouz, R.A.F.V.R., No. 196 Sqn.
Flt. Lt. J. R. S. Halford, R.A.F.V.R., No. 274 Sqn.
Flt. Lt. D. W. Morison, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
Flt. Lt. J. W. Perry, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
Flt. Lt. F. R. Shedd, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
Act. Flt. Lt. W. E. Adams, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
Act. Flt. Lt. E. J. Alberts, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Act. Flt. Lt. J. M. Barker, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
Act. Flt. Lt. J. J. Cooper, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
Act. Flt. Lt. T. K. Edwards, R.C.A.F., No. 582 Sqn.
Act. Flt. Lt. E. M. C. Franklin, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
Act. Flt. Lt. W. T. Gee, R.C.A.F., No. 97 Sqn.
Act. Flt. Lt. G. M. Goodman, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
Act. Flt. Lt. C. R. Jones, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
Act. Flt. Lt. L. J. Kennedy, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
Act. Flt. Lt. C. G. Kerr, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
Act. Flt. Lt. J. A. MacDonald, R.C.A.F., No. 61 Sqn.
Act. Flt. Lt. K. A. Matheson, R.C.A.F., No. 49 Sqn.
Act. Flt. Lt. J. D. Mawson, R.C.A.F., No. 427 Sqn.
Act. Flt. Lt. E. B. Palmer, R.C.A.F., No. 138 Sqn.
Act. Flt. Lt. C. P. Shannon, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
Act. Flt. Lt. J. C. Shuttleworth, R.C.A.F., No. 138 Sqn.
Act. Flt. Lt. G. D. Stark, R.C.A.F., No. 425 (R.C.A.F.) Sqn. (since deceased).
Act. Flt. Lt. J. C. Wells, R.C.A.F., No. 635 Sqn.
Act. Flt. Lt. W. M. B. Wood, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
F/O. N. G. Barker, R.C.A.F., No. 103 Sqn.
F/O. R. J. Bayne, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. W. B. Byers, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
F/O. G. A. Cantrell, R.C.A.F., No. 15 Sqn.
F/O. D. D. Carr, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
F/O. J. R. Coffey, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. W. G. Corbett, R.C.A.F., No. 102 Sqn.

Air Chief Marshal Sir John Baldwin, A.O.C.-in-C., 3rd Tactical Air Force, S.E.A.C., who is on leave in Britain.

F/O. H. K. de Beck, R.C.A.F., No. 625 Sqn.
F/O. G. A. Greene, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
F/O. J. B. Hall, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
F/O. G. F. Harkins, R.C.A.F., No. 433 (R.C.A.F.) Sqn.
F/O. J. T. Head, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
F/O. W. F. Hill, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
F/O. T. S. Horswill, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
F/O. C. M. Huget, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
F/O. J. E. Logan, R.C.A.F., No. 9 Sqn.
F/O. A. B. S. Lyndon, R.C.A.F., No. 105 Sqn.
F/O. A. N. MacLennan, R.C.A.F., No. 417 (R.C.A.F.) Sqn.
F/O. E. J. McConkey, R.C.A.F., No. 578 Sqn.
F/O. G. McCracken, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
F/O. W. F. Newman, R.C.A.F., No. 138 Sqn.
F/O. H. W. O'Corman, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
F/O. J. Pawlyshyn, R.C.A.F., No. 622 Sqn.
F/O. E. W. Hallett, R.A.F.V.R., No. 61 Sqn.
F/O. H. F. Jenkins, R.A.F.V.R., No. 10 Sqn.
F/O. G. C. John, D.F.M., R.A.F.V.R., No. 35 Sqn.
F/O. D. A. Keeble, R.A.F.V.R., No. 9 Sqn.
F/O. R. LeCudenec, R.A.F.V.R., No. 10 Sqn.
F/O. H. B. MacKinnon, R.A.F.V.R., No. 57 Sqn.
F/O. B. McL. Melville-Smith, R.A.F.V.R., No. 75 (N.Z.) Sqn.
F/O. W. Mooney, D.F.M., R.A.F.V.R., No. 630 Sqn.
F/O. F. F. Mapes, R.A.F.V.R., No. 571 Sqn.
F/O. D. W. Moore, R.A.F.V.R., No. 102 Sqn.
F/O. J. A. Pearson, R.A.F.V.R., No. 97 Sqn.
F/O. S. R. Pryor, R.A.F.V.R., No. 149 Sqn.
F/O. C. N. Saunders, R.A.F.V.R.
F/O. D. Shaw, R.A.F.V.R., No. 426 (R.C.A.F.) Sqn.
F/O. W. J. Simpson, D.F.M., R.A.F.V.R., No. 35 Sqn.

F/O. E. Twells, R.A.F.V.R., No. 617 Sqn.
F/O. R. E. Walker, D.F.M., R.A.F.V.R., No. 640 Sqn.
F/O. J. L. Ware, R.A.F.V.R., No. 625 Sqn.
F/O. J. C. Lumsden, R.A.F.V.R., No. 57 Sqn.
F/O. E. O'Connor, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.
F/O. C. E. Thompson, R.A.F.V.R., No. 106 Sqn.
Flt. Lt. W. G. Craig, R.A.A.F., No. 451 (R.C.A.F.) Sqn.
Flt. Lt. J. A. Critchley, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
Flt. Lt. F. H. Dengate, R.A.A.F., No. 15 Sqn.
Flt. Lt. P. E. McCarthy, D.F.M., R.A.A.F., No. 467 (R.A.A.F.) Sqn.
F/O. A. W. G. Connor, D.F.M., R.A.A.F., No. 630 Sqn.
F/O. R. O. Fuller, D.F.M., R.A.A.F., No. 467 (R.A.A.F.) Sqn.
F/O. D. J. Hegarty, R.A.A.F., No. 83 Sqn. (since deceased).
Flt. Lt. P. A. Bates, R.A.F.V.R., No. 141 Sqn.
P/O. W. G. Cadman, R.A.F.V.R., No. 141 Sqn.
Flt. Lt. J. Clarke Surman, R.A.F.V.R., No. 604 Sqn.
P/O. C. E. Weston, R.A.F.V.R., No. 604 Sqn.
Flt. Lt. C. T. Butt, R.A.F.V.R., No. 140 Sqn.
Flt. Lt. H. McLachlan, R.C.A.F., No. 94 Sqn.
Flt. Lt. F. B. Young, R.C.A.F., No. 442 (R.C.A.F.) Sqn.
Flt. Lt. J. Eames, R.A.F.V.R., No. 409 (R.C.A.F.) Sqn.
F/O. C. W. Chown, R.C.A.F., No. 515 Sqn.
F/O. R. M. Davenport, R.C.A.F., No. 401 (R.C.A.F.) Sqn.
F/O. A. E. Nye, R.A.F.V.R., No. 514 Sqn.
F/O. L. C. Ainsley, R.A.F.V.R., No. 51 Sqn.
F/O. H. J. L. McKinley, R.C.A.F., No. 575 Sqn.
W/O. A. E. Smith, R.A.F.V.R., No. 575 Sqn.
Sqn. Ldr. J. A. Hatch, R.C.A.F., No. 409 (R.C.A.F.) Sqn.
Flt. Lt. R. G. F. Lee, R.A.F.V.R., No. 245 Sqn.
Sqn. Ldr. R. G. N. Pryor, R.A.F.V.R., No. 148 Sqn.
Flt. Lt. W. R. Smith, R.A.F., No. 76 Sqn.
F/O. A. Menaul, R.C.A.F., No. 404 (R.C.A.F.) Sqn.
F/O. J. Tomes, R.C.A.F., No. 404 (R.C.A.F.) Sqn.
F/O. R. ... Chilcott, R.A.A.F., No. 158 Sqn.
F/O. J. R. Currie, R.A.F.V.R., No. 77 Sqn.
F/O. R. E. Johnson, R.C.A.F., No. 158 Sqn.
P/O. H. A. Fawcett, R.C.A.F., No. 139 Sqn.

Distinguished Flying Medal

Flt. Sgt. E. D. O'Callaghan, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
Flt. Sgt. (now W/O.) W. P. Kelly, R.A.A.F., No. 65 Sqn.
Flt. Sgt. V. J. Kyrke-Smith, R.A.F., No. 39 Sqn.
Flt. Sgt. (now P/O.) C. J. S. Potter, No. 115 Sqn.
Flt. Sgt. A. J. Toft, R.A.F.V.R., No. 148 Sqn.
Flt. Sgt. C. H. Stewart, R.C.A.F., No. 619 Sqn.
Sgt. J. R. Main, R.C.A.F., No. 415 (R.C.A.F.) Sqn.
Sgt. H. C. Wenborn, R.A.F.V.R., No. 102 Sqn.
Sgt. J. Sherry, R.A.F.V.R., No. 514 Sqn.
Sgt. A. F. Beckford, R.A.F.V.R., No. 514 Sqn.

THE KING has been graciously pleased to approve the following awards:—

O.B.E. (Mil.)

Group Capt. A. J. Hauchet Taylor, R.C.A.F., M.B.E. (Military).
Flt. Lt. L. Beever-Potts, R.C.A.F.

George Medal

Sqn. Ldr. L. W. W. Modley, O.B.E., R.A.F.O.—One night in November, 1943, this officer displayed courage in assisting ashore the survivors of the crew of a Wellington aircraft which had crashed on a heavy sea. He was one of a party of helpers who managed to climb out on to some rocks at a point about 50 yards from the airmen who were then in their dinghy. Sqn. Ldr. Modley volunteered to swim to them with a rope, but the heavy seas rendered the chance of success unlikely and he was dissuaded from this. Eventually a weighted rope was thrown to the nearest airman in order that it might be secured to the rocks which the survivors had now reached. In order to obtain sufficient length of rope to enable the airmen to fasten the rope to the rocks at their end, Sqn. Ldr. Modley tied the other end around his waist and clung to the furthermost point of the rocks on which the rescue party was stationed. In this position, with heavy seas breaking over him, he was able to act as an anchor. The survivors were able to cross the sea by using the rope and, with Sqn. Ldr. Modley's assistance, they were pulled to safety. On another occasion in May, 1944, a Spitfire aircraft dived into the ground from a height of about 100ft.; the pilot sustained severe injuries and was rendered unconscious. The fire tender arrived on the scene within 30 seconds of the crash and Sqn. Ldr. Modley, who was in command at the airfield, arrived almost simultaneously. He saw the pilot amongst the wreckage and, with the assistance of two members of the fire crew, immediately endeavoured to rescue him. Whilst the three men were lifting the pilot out of the cockpit, a violent explosion occurred which threw them to the ground. The petrol tanks had exploded and the aircraft became enveloped in flames. The pilot remained face downwards over the side of the fuselage. Sqn. Ldr. Modley, completely undaunted by the explosion, at once rushed back into the flames and resumed his rescue work. He was successful in dragging the pilot clear. Meanwhile, two members of the fire crew brought

AVIATION

the fire hose into action and assisted Sqn. Ldr. Modley to extinguish the flames on the pilot's burning clothes. Unfortunately the pilot died of his injuries. In effecting this rescue Sqn. Ldr. Modley sustained burns to his hands, face and ankles.

Act. Sqn. Ldr. S. J. DAVIES, M.B.E., R.A.F.—In May, 1944, this officer was in the vicinity when an aircraft, shortly after taking off on an operational flight, crashed and burst into flames. Sqn. Ldr. Davies immediately drove to the scene and observed the rear gunner collapse in an attempt to get out of the aircraft. Heedless of the danger from the ammunition which was exploding, and also being aware that the aircraft carried bombs, he climbed on to the wing to extricate the rear gunner whose head and shoulders were hanging over the side of the cockpit. He had to free the latter's harness, which had become entangled in some part of the aircraft, but he finally managed to lift him out of the cockpit and drag him clear of the burning wreckage. Sqn. Ldr. Davies then attempted to lift the body of the pilot out of the blazing front cockpit, but was unsuccessful in doing this owing to the smoke and flames. He could see that the pilot had been killed in the crash. After warning all personnel of an imminent explosion he, with assistance from another airman, carried the gunner to the sick quarters. Less than two minutes after he had left the scene, two 500 lb. bombs exploded, completely destroying the aircraft. The timely and courageous action of Sqn. Ldr. Davies had saved the life of the rear gunner.

Act. W/O. J. T. S. STEVENS, R.A.F.—In February, 1944, an aircraft returned from operations with ten bombs fused with three types of long delay fuses. When work was in progress to remove the bombs from the aircraft, seven fell from the bomb racks and, in view of the nature of the fuses, they were quickly segregated by the Station Ordnance Officer. Special equipment was necessary to remove the fuses, and later W/O. Stevens, accompanied by another officer, reported at the station with apparatus which he had designed to deal with these types of fuses by remote control. Although a safety period had occurred equal to twice the normal delay of the fuses, W/O. Stevens knew that, in the cold weather which prevailed, the behaviour of such fuses is quite unpredictable and that detonations might occur whilst he was still working on the bombs. In spite of this he carried out his task and, after two hours, had successfully withdrawn the fuses from the bombs. He was using his apparatus for the first time and it had not been subjected to any previous test. He showed complete disregard of danger throughout. W/O. Stevens has displayed great devotion to duty whilst employed on bomb disposal work for the past three years and, in conjunction with other officers, has taken part in some 16 bomb disposal operations, a good proportion of which have been of an experimental nature in which apparatus made by him has been employed.

B.E.M. (Mil.)

Flt. Sgt. J. GREASLEY, R.A.F.V.R.—In June, 1944, Flt. Sgt. Greasley, a flying instructor, was flying a Tiger Moth, having a pupil navigator on board, when he noticed an aircraft blazing on the ground. He immediately came down low and circled the aircraft. Seeing no assistance being rendered, he landed about 100 yards away from the crash. The crashed aircraft was burning furiously and one of the petrol tanks had been thrown clear and was on fire. There was imminent risk of the tank exploding and of the remaining tank in the aircraft doing likewise. Nevertheless, disregarding his own safety, Flt. Sgt. Greasley searched the blazing wreckage and, with the help of his pupil, he dragged the navigator clear and beat out the flames on his burning clothing. The navigator, however, was dead. Flt. Sgt. Greasley returned to search for the pilot, but was unsuccessful in discovering him. Flt. Sgt. Greasley showed great presence of mind, coolness and courage. He had to make a hazardous landing and then took a considerable risk in carrying out rescue work when there was a possibility of petrol tanks exploding.

Flt. Sgt. C. H. BROOKS, R.C.A.F.
Flt. Sgt. R. N. J. DUPUIS, R.C.A.F.
Sgt. H. G. J. SAVS, R.C.A.F.
Cpl. (now P/O.) T. H. HUNT, R.A.F.

Foreign Decorations

THE KING has granted unrestricted permission for the wearing of the undermentioned decorations conferred upon the personnel indicated in recognition of valuable services rendered in connection with the war:—

Conferred by the President of the United States of America

Bronze Star Medal

Flt. Lt. P. E. COOK, R.A.F.V.R.

Soldiers Medal

W/O. E. A. HYDE, R.A.F.
L.A/C. T. B. LOGAN, R.A.F.V.R.
L.A/C. W. N. MARTIN, R.A.F.V.R.
L.A/C. G. R. MONTGOMERY, R.A.F.V.R.

Roll of Honour

Casualty Communiqué No. 448.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list, 63 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. L. D. Bateman; Sgt. W. H. Bellamy; Sgt. D. Braithwaite; Flt. Sgt. J. E. Clague; P/O. J. F. Fink; Sgt. G. A. Girling; Sgt. C. J. Greenhill; Flt. Sgt. R. T. J. Griffiths; Flt. Lt. J. D. Hancock; Flt. Sgt. W. Hatton; Flt. Sgt. S. W. G. Little; Flt. Sgt. I. E. O. Morgan; Sgt. G. T. Nicholson; Sgt. D. Reed; F/O. P. A. Schade, D.F.M.; Sgt. W. A. Thomas; Sgt. J. Woodward.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. J. Blair; Sgt. N. W. E. Blatch; Sgt. R. A. Boothman; Sgt. M. Boylan; P/O. W. J. V. Cabie; P/O. J. Earle; Sgt. O. V. Kent; W/O. R. Reid; Sgt. E. Smith; P/O. A. P. E. Strange; Flt. Sgt. W. A. Walke; Sgt. P. E. Wells.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—W/O. K. L. O. Blow; F/O. H. F. C. Bonner; F/O. E. V. Harley; Sgt. C. Hunt; Flt. Sgt. T. Mair; P/O. A. Mann; Sgt. S. Martin; Sgt. F. Mills; Sgt. J. Peart; Sgt. N. F. Petty; Flt. Lt. P. J. M. Prangley; Sgt. A. S. Rushby; F/O. A. V. Shirley.

WOUNDED OR INJURED IN ACTION.—Sgt. C. L. Barugh; Sgt. A. H. Flint; L.A/C. P. Hobson; F/O. L. J. Howell; L.A/C. N. A. Thompson; Sgt. J. H. West; Flt. Sgt. R. Whestone.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. R. G. Cook.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. Beech; Flt. Sgt. P. J. Birt; Sgt. R. England; Sgt. J. R. Grint; Cpl. F. N. Lawrence; Flt. Sgt. R. E. Piper; Flt. Sgt. E. Rigby; P/O. J. M. Roberts; Flt. Sgt. C. R. Shannon; Flt. Sgt. A. W. Smith; Flt. Sgt. H. A. Stares.

MISSING.—P/O. W. Abbott; Sgt. G. A. Alexander; Sgt. F. Allen; P/O. P. L. Alp; F/O. S. M. Anderson; Sgt. B. H. Armitage; Sgt. C. M. Ashford; Flt. Lt. H. A. B. Baker; Sgt. R. C. Baker; Sgt. W. G. Barlow; Flt. Sgt. R. H. Barnes; Sgt. D. A. Bassett; F/O. A. H. J. Begernie; Flt. Sgt. E. W. Bellhouse; Flt. Sgt. D. W. Blumfield; Sgt. F. C. Bright; Sgt. W. Broughton; Flt. Sgt. T. Bryan; Sgt. S. C. J. Butcher; W/O. J. W. Butterworth; Sgt. C. C. Cannon; Sgt. D. A. Cossey; Sgt. H. E. L. Craze; Flt. Sgt. E. Crowther; Sgt. D. W. Dagger; Act. F/O. J. G. Dalen; Flt. Sgt. W. J. Daly; Sgt. T. Davenport; Sgt. J. E. W. Dickinson; Sgt. J. F. Dineen; W/O. G. C. Dinsdale; Flt. Sgt. W. E. Edwards; Sgt. T. W. Elliott; P/O. K. P. Evans; Sgt. E. Evison; Sgt. T. F. Frogley; Flt. Sgt. V. Gallagher; Act. Flt. Lt. G. R. Garlick; Sgt. A. H. Garnham; Sgt. P. N. Gilbert; Sgt. T. M. Gordon; Flt. Sgt. J. Hague; Sgt. A. H. Hall; Sgt. N. Hannah; P/O. R. T. W. Harwood; F/O. R. Heald; Sgt. C. Higgins; Sgt. W. F. Hinett; Flt. Sgt. R. S. Horsford; F/O. G. E. W. Howells; Sgt. E. J. Hunaber; Sgt. H. R. S. Hunnisett; W/O. W. H. Hunter; Sgt. B. L. Jaeger; Flt. Sgt. G. W. Jameson; Sgt. W. J. Jarman; Flt. Sgt. C. R. Jerwood; Sgt. R. P. Kinnear; Act. F/O. C. Lacy; Sgt. B. Leighton; Flt. Sgt. L. A. Lenox; Sgt. S. W. Ling; F/O. R. Logan; F/O. W. R. Lott; Flt. Sgt. L. R. Lutwyche; F/O. A. G. McCarthy; Flt. Sgt. P. A. MacGibbon; P/O. F. McGlone; Act. F/O. W. R. McNaughton; Sgt. J. Magee; Sgt. A. Marper; Sgt. F. W. Mills; F/O. F. E. Mitchell; Flt. Sgt. J. S. Mitchell, D.F.M.; Flt. Sgt. J. L. B. Morgan; Sgt. A. E. Morton; Sgt. C. A. Morton; Sgt. T. Mullen; Sgt. D. G. Mumford; Sgt. L. A. Newell; Flt. Sgt. N. Oates; F/O. J. W. Oldham, D.F.M.; Sgt. G. Perry; Flt. Sgt. G. J. Perry; Act. Flt. Lt. J. A. Platten; Act. P/O. J. E. A. Pyle; Sgt. A. W. Radley; P/O. L. Robin; Flt. Lt. P. J. Rossington; F/O. H. Sellers; Sgt. W. Shaw; Sgt. K. R. Shepstone; Sgt. I. Shingles; Sgt. H. J. W. Simmonds; Flt. Sgt. D. E. Simmons; Sgt. J. W. Simpson; Sgt. F. B. Smith; Sgt. J. L. Spaven; Sgt. N. D. Staff; F/O. J. Stephensen; Flt. Sgt. K. C. Stuart; Sgt. A. Sunkovitch; W/O. J. F. R. Tate; Sgt. O. Thomas; F/O. R. Tibbs; Flt. Sgt. E. Tomlinson; Flt. Sgt. L. Tomlinson; Sgt. H. E. Turner; Sgt. R. F. H. Viollet; Sgt. E. A. Wakeman; Sgt. D. Wensley; Sgt. R. P. Whitehall; Sgt. J. H. Whitham; Flt. Sgt. G. D. Williams; Sgt. R. Williams; Sgt. A. Wilson; Act. F/O. L. J. Wood; Sgt. B. Woodward.

KILLED ON ACTIVE SERVICE.—Sgt. F. Hellwell; Sgt. I. B. Livingstone; Act. Flt. Lt. A. C. A. Michiels.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. R. H. Kershaw.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Sgt. T. T. A. Goodfellow.

DIED ON ACTIVE SERVICE.—Cpl. N. S. Craig; Cpl. T. F. Gargarth; L.A/C. W. P. Harris; L.A/C. R. H. Harwood; L.A/C. W. McGregor.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. F. L. Cook; P/O. R. A. Hebditch, D.F.M.

Royal Australian Air Force

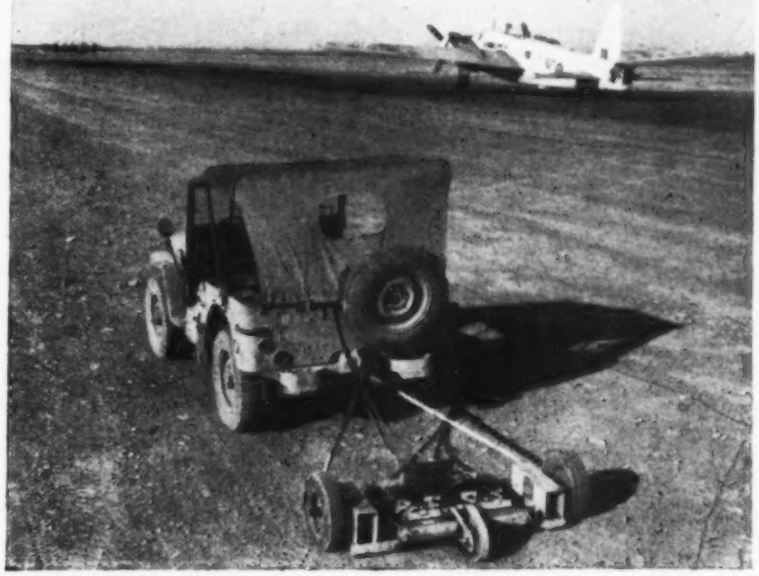
KILLED IN ACTION.—W/O. S. F. Gerty; Flt. Sgt. H. R. Mann; Flt. Sgt. J. C. L. Small; Flt. Sgt. E. P. Smith; P/O. V. Starkoff.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. N. J. Edmonds; P/O. R. E. Inglis; W/O. R. K. Thomas; W/O. R. R. Wicks; W/O. K. A. Wood.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. S. H. Davies; Flt. Sgt. A. G. Jasper; W/O. C. A. Sceney; P/O. H. B. Shaw; Flt. Sgt. G. A. B. Taverner.

MISSING.—P/O. W. D. Appleyard; Flt. Sgt. A. O. Beazley; Act. F/O. P. B. Dennett; Flt. Sgt. J. H. Elder; F/O. B. P. Fraser; P/O. H. Glasby; P/O. G. L. Heath; W/O. L. B. Holmes; P/O. J. T. Millinger; Flt. Sgt. W. Murphy; Act. F/O. R. E. Pellew; Flt. Sgt. D. J. Ryan; P/O. E. R. Tibbits.

KILLED ON ACTIVE SERVICE.—P/O. M. L. Cecil; F/O. A. M. Montgomery; F/O. R. F. Stephens.



CARPET SWEEPER: A magnetic sweeper devised by the R.A.F. to remove pieces of metal embedded in the runways of airfields. It rejoices in the expressive name of "The Snifter."

SERVICE AVIATION

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Lt. P. G. Johnson, D.F.C.; P/O. S. G. McL. Ross; F/O. A. Tulloch.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—W/O. W. D. Brown; Sgt. R. V. B. Knox; Sgt. T. McP. Martin; F/O. T. J. Muir; Act. Flt. Lt. P. T. Sargent; Flt. Sgt. G. R. A. Walkem.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. H. L. Anderson; F/O. M. E. Balkam; Flt. Sgt. D. H. Bates; P/O. R. K. Clements; Flt. Sgt. H. Dubnick; Sgt. D. Durrell; Flt. Sgt. H. P. Gaudry; F/O. E. J. Hepburn; P/O. G. K. Hignell; P/O. T. W. Hilliard; F/O. E. B. Kirkham; Flt. Sgt. T. Y. Kirkham; P/O. J. W. O. R. Le Brock; W/O. J. A. Lesage; Flt. Sgt. C. M. MacDonald; F/O. G. H. Markle; Sgt. G. A. May; W/O. L. Mieyette; Flt. Sgt. F. J. Neal; Act. Sqn. Ldr. H. P. Peters, D.F.C.; W/O. T. J. Roche; Flt. Sgt. L. B. Russell; Flt. Sgt. C. R. Smyth; F/O. A. V. Snook; P/O. M. B. Summers; P/O. J. Wilde; F/O. C. A. Wright.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—P/O. P. McD. MacIntyre; W/O. I. E. Smithson.

WOUNDED OR INJURED IN ACTION.—F/O. R. McL. Birnie; Sgt. E. H. Smith.

MISSING, BELIEVED KILLED IN ACTION.—P/O. L. H. Hopper.

MISSING.—F/O. H. F. S. Best; Flt. Sgt. W. S. A. Birks; Flt. Sgt. J. A. Blasko; F/O. H. H. Borchardt; Sgt. N. A. Boucher; Britten; W/O. A. J. Britts; Sqn. Ldr. C. G. Bull; Flt. Sgt. W. A. Cameron; F/O. W. R. Chowen; P/O. R. S. Cole; P/O. D. A. Cooper; Flt. Lt. J. A. L. Couture; Flt. Sgt. V. F. Dodds; Sgt. J. T. G. G. Dufour; F/O. J. W. K. Dunn; Flt. Sgt. H. F. Edmunds; F/O. J. S. P. Fitzpatrick; Flt. Sgt. J. A. Garbutt; Sgt. J. Geddes; Sgt. J. Z. Girous; P/O. N. E. Hagerty; Flt. Sgt. G. T. Hodgson; Flt. Sgt. F. C. Hollenhock; P/O. G. Jackson; Flt. Sgt. K. A. Jeffery; W/O. J. K. Johnson; F/O. J. J. R. Johnson; W/O. W. O. D. Larmouth; Sgt. J. E. Lockett; P/O. A. McKim; Sgt. J. R. MacKinnon; Flt. Sgt. J. F. Mara; P/O. E. M. Matheson; F/O. J. Morrison; Sgt. J. H. Morriss; Flt. Sgt. W. H. Pool; Flt. Sgt. A. J. Rammage; Sgt. K. E. Rhodes; Flt. Sgt. C. N. Samson; Flt. Sgt. J. E. Shuster; F/O. J. A. Smith; Flt. Sgt. M. S. Stoyko; P/O. A. F. Taillon; W/O. B. P. Upper; Flt. Lt. J. D. Virtue; P/O. W. W. Watson; Sgt. J. E. Williams; P/O. A. J. Wiliamson; F/O. H. J. Wilson; Flt. Sgt. W. A. Youngs.

KILLED ON ACTIVE SERVICE.—Sgt. F. G. Brezina; Sgt. J. A. Calder; P/O. J. C. L. Carriere; Sgt. D. F. Dittmer; Sgt. R. G. Foster; Sgt. F. H. Green; Sgt. N. A. Hartrick; Sgt. R. O. G. Ives; F/O. G. A. Lewthwaite; Sgt. J. M. Ludlow; P/O. A. D. Moffat; Sgt. A. C. Reynolds.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. G. P. Speirs.

Royal New Zealand Air Force

MISSING, BELIEVED KILLED IN ACTION.—W/O. K. Dudding.

MISSING.—Act. F/O. N. W. Donnelley; F/O. D. I. Grant; Flt. Sgt. G. S. Richardson; Act. F/O. K. O. Whitehouse.

Casualty Communiqué No. 449

Of the names in this list 76 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—F/O. P. Clark

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. E. Arter; Sgt. W. T. Barnes; Sgt. J. J. Butler; Sgt. J. C. Hinks; Sgt. F. MacPherson; P/O. A. Thorp; Sgt. J. T. Zuidmulder.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. C. Arrowsmith; Flt. Sgt. G. F. Austin; Sgt. A. T. Bateman; Sgt. A. A. Brandon; Sgt. F. Brown; Sgt. C. W. Charrott; Sgt. A. A. Copeland; Flt. Sgt. S. Cowley; Sgt. J. R. G. Day; Flt. Sgt. C. D. B. Dubery; P/O. A. U. Duncan; Flt. Sgt. A. G. Dyson; Flt. Sgt. G. K. M. Elliott; Flt. Sgt. A. H. Evans; Sgt. L. F. Eyre; Flt. Sgt. E. Fairie'd; Sgt. A. Fogg; Flt. Sgt. K. Garnett; Flt. Sgt. E. H. Gybbon; Flt. Sgt. R. Gittus; Sgt. W. E. Gough; Sgt. L. C. Grant; Flt. Lt. J. A. Grundy; Flt. Sgt. W. J. Hall; Sgt. L. N. Harris; Flt. Sgt. G. L. Hart; Sgt. A. H. Haworth; Sgt. P. G. Higham; Act. Flt. Lt. L. D. Hosking; Flt. Sgt. A. F. Hubball; Sgt. D. E. Jeffery; P/O. R. E. Jobling; Sgt. J. A. Johnstone; Sgt. H. G. King; Sgt. J. Lusby; Sgt. W. E. T. Michell; Sgt. A. S. Moore; Flt. Sgt. S. V. Moss; Sgt. D. J. Nuttman; Sgt. G. O. Payne; Sgt. R. E. Pedder; F/O. J. W. Potts; P/O. L. J. Powell; Sgt. T. Powell; Sgt. W. E. Pyne; Sgt. T. G. Roberts; Sgt. W. Rowand; Flt. Sgt. W. G. F. Saddler; Flt. Sgt. C. Smith; Flt. Sgt. F. Smith; F/O. K. Stakes; Sgt. C. D. L. Stewart; Sgt. J. F. Stubbington; P/O. J. A. Swift; Sgt. F. Thrall; Sgt. F. Tomachepolsky; Flt. Lt. J. P. Tremlett; Sgt. J. Wadsworth; Sgt. E. G. Wall; Sgt. R. N. Walne; F/O. D. R. Walton; F/O. D. Watson; Act. Flt. Lt. R. F. Wells; Sgt. C. T. Wheldon; Wing Cdr. C. L. Y. Wright; F/O. P. M. Wroath; F/O. R. S. Yeadon; Sgt. L. G. Yorke.

MISSING, BELIEVED KILLED IN ACTION.—F/O. R. Anthony; F/O. D. G. Bennett; F/O. A. S. Middleton; F/O. W. C. Vatcher.

MISSING.—Sgt. J. Allison; Sgt. W. Y. Anthony; Sgt. F. T. Armstrong; Flt. Sgt. F. R. Ashcroft; Sgt. E. Ashton; Sgt. E. Attenborrow; W/O. N. Baird; Sgt. C. J. Baynes; Sgt. W. W. Beattie; Flt. Sgt. E. Berwick; Flt. Lt. H. D. Binns; F/O. J. D. Black; Flt. Sgt. J. H. Blane; Sgt. W. E. Blore; Sgt. A. B. E. Booth; Flt. Sgt. J. Broll; Sgt. S. Brook; Flt. Sgt. K. A. Brooke; Sgt. C. Brown; Flt. Sgt. H. McB. Brown; F/O. A. G. Burgess; Sgt. G. B. Byrne; Flt. Lt. J. W. Caddie; Sgt. E. D. Carmichael; Sgt. C. T. W. Carpenter; Flt. Sgt. P. Cashin; Sgt. W. J. Cock; Act. F/O. H. W. Cooper; P/O. F. Copland; Sgt. H. E. Cowling; F/O. J. F. Crossley; P/O. J. M. Cunningham; Sgt. C. Custance; Act. F/O. E. Dalgleish; F/O. G. A. Davey; Sgt. R. J. Davies; Flt. Lt. W. G. Davies; Sgt. N. Derham; Sgt. A. Dickson; Sgt. W. Dutton; Flt. Sgt. K. A. Fairclough; P/O. F. Farnham, D.F.M.; Sgt. J. H. Fellows; Sgt. T. Fergus; Sgt. E. J. Flaherty; P/O. M. Flanagan; Flt. Sgt. L. W. Fox; Sgt. R. A. Gaut; Sgt. H. M. Glansford; Sgt. E. C. W. Goode; F/O. J. P. Graham; Sgt. E. B. Grasso; Sgt. K. W. Green; Flt. Sgt. P. M. Griffiths; P/O. G. A. Grigg; Sgt. H. Grisdale; Flt. Sgt. H. L. Guy; Flt. Sgt. E. J. Hack; Act. F/O. N. Hadley; Sgt. T. E. Hardy; Flt. Lt. H. R. Harrison, D.F.C.; Act. F/O. R. T. Hayes; Sgt. E. R. Hearn; Sgt. J. A. Helliwell; Flt. Sgt. K. Hibbert; Sgt. G. H. Holt; Flt. Sgt. A. R. Hope; Flt. Sgt. I. E. Hurley; P/O. K. T. Hutton; F/O. D. S. Jones; Act. Flt. Lt. G. L. Jones; Flt. Sgt. P. G. Jones; Flt. Sgt. T. D. Jones; Act. Flt. Lt. J. A. Kidd; Sgt. W. Kirkland; Flt. Sgt. W. Lane; F/O. G. F. Larcey; W/O. J. L. Lassam; Flt. Sgt. W. H. G. Lebatt; Sgt. R. L. Lee; F/O. R. S. Little; F/O. W. G. Llewellyn; Sgt. H. N. Lloyd; Sgt. H. E. Long; Flt. Sgt. C. A. Longland; Sgt. R. A. Lowe; Sgt. G. H. Lucas; P/O. T. J. A. McFadden; Sgt. H. McGuigan; Sgt. A. McIntyre; Sgt. J. E. Mackintosh; Sgt. A. F. Marshall; P/O. S. Martin; Flt. Sgt. D. M. Maughan-Taylor; Flt. Sgt. K. G. Meehan; Sgt. K. F. Merrifield; F/O. T. J. Middleton; P/O. C. F. T. Miles; Sgt. L. Miles; P/O. D. Millar; Flt. Sgt. G. C. Mitchell; Sgt. J. R. Moody; Act. F/O. S. B. Morcom; Sgt. D. D. Morgan; Sgt. W. N. Morgan; Act. Flt. Lt. A. S. Morton, A.F.C.; Flt. Sgt. P. J. Mosley-Leigh; Sgt. W. W. Munn; Flt. Sgt. J. F. Murray; Flt. Sgt. A. Myres; Sgt. R. P. Naylor; Sgt. A. J. Newell; P/O. C. H. Ogden, D.F.C.; F/O. R. W. Orbell; Flt. Lt. B. G. L. O'Reilly; Sgt. R. Palmer; F/O. J. Parker; Sgt. A. O. Parkhill; Sgt. D. H. Phillips; F/O. N. L. St. G. Pleasance; Sgt. K. G. Porter; Sgt. F. A. Powell; Sgt. J. W. G. Pringle; Sgt. N. McK. Rice; F/O. T. Rich; Sgt. P. H. Richardson; Sgt. L. Salway; Sgt. J. R. Scott; Flt. Sgt. R. F. Scott; Sgt. W. A. Sharp; Sgt. S. Sinclair; Sgt. R. V. Skeetes; Sgt. J. A. Slater; Sgt. J. W. Smith; Flt. Sgt. M. S. Smith; Sgt. R. W. Stafford; P/O. W. Stead; Flt. Sgt. E. Stewart; Flt. Sgt. B. Stroud; Sgt. L. E. Swallow; Sgt. A. W. Swindell; Sgt. C. Sykes; Sgt. D. G. Tarbin; Sgt. C. Taylor; Sgt. W. C. Taylor; Flt. Sgt. W. J. Thomas; Sgt. E. Thomason; F/O. J. B. Thompson; Sgt. T. W. Thompson; Sgt. W. R. Tomlinson; Sgt. J. Tweedie; Sgt. W. Wallace; Sgt. J. R. Ward; F/O. S. C. Ware; Sgt. J. Webster; Flt. Sgt. S. Whitehurst; Sgt. J. G. Whitworth; Sgt. L. G. Whybrow; Sgt. R. A. Wilkins; Sgt. E. M. C. Wilkinson; Sgt. B. C. Winson; Flt. Sgt. L. G. Wood, P/O. B. St. J. Woollard, P/O. H. C. Young.

KILLED ON ACTIVE SERVICE.—Sgt. J. D. Bould; Sgt. B. N. Chisnall; Sgt. F. V. Davis; P/O. S. M. Laird; Sgt. W. A. Lewin; Sgt. J. G. McLeod; Sgt. W. L. O'Connor; Sgt. A. M. Salter; Sgt. S. C. Slade; P/O. B. W. H. Stalvies; F/O. J. E. Thompson; Sgt. J. D. D. Watt; Cpl. H. V. Wright.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. W. E. Fern.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. R. F. Ansell, A/C.2 P. J. Copeland; Sgt. W. J. Magill; Cpl. I. R. Morris; P/O. J. M. Paton; Sgt. C. T. Ress.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/C. G. A. Oxborough; Sgt. D. G. E. Wilkins.

DIED ON ACTIVE SERVICE.—L.A/C. C. Shivas; L.A/C. W. H. Witcherley.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. R. T. Lathlean; Flt. Sgt. D. A. Rogers.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. P. J. Conway; P/O. W. D. Croft; P/O. K. B. Smith.

MISSING.—F/O. F. H. Baggs; Flt. Sgt. N. Brand; P/O. H. W. E. Donald; F/O. J. A. Ewen; Act. F/O. K. H. Freeman; Flt. Sgt. A. H. Jenkins; Flt. Lt. T. S. McCartney; Flt. Sgt. D. A. Paterson; Flt. Sgt. W. Paul; Flt. Sgt. D. M. R. Purdue; F/O. F. R. Tickle; W/O. J. A. Upton; Act. F/O. R. J. Walsh, D.F.C.; Flt. Sgt. M. S. Whiteley; P/O. W. H. E. Wright.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Sgt. A. L. Cheatle.

Royal Canadian Air Force

KILLED IN ACTION.—W/O. J. W. P. Fournier; F/O. J. Kalen; F/O. W. E. Linning.

MISSING, BELIEVED KILLED IN ACTION.—Sqn. Ldr. W. C. Ahrens.

MISSING.—W/O. A. D. Aumell; P/O. H. F. Axford; F/O. F. K. Beers; F/O. R. W. Blair; P/O. P. H. Brittain; F/O. D. O. Brown; P/O. R. E. Burton; Flt. Sgt. D. S. Campbell; Flt. Sgt. M. J. W. Cantwell; Flt. Sgt. R. G. Carrothers; Flt. Sgt. D. A. Carson; Sgt. B. H. Cooper; Sgt. W. L. Dalgish; P/O. E. A. W. Dawson; Sgt. K. W. Dewey; F/O. R. G. Ellis; F/O. B. G. Foy; Sgt. T. M. Galvon; Flt. Lt. S. F. Garland; Flt. Sgt. W. L. Gillespie; P/O. F. G. Graham; P/O. W. St. C. Haley; Flt. Sgt. L. A. Higgins; Sgt. R. A. Johnson; P/O. T. R. Kelly; Act. Sqn. Ldr. J. B. Kerr; F/O. J. J. Kommes; Flt. Sgt. S. J. Kozlowski; F/O. R. E. Linklater; Flt. Sgt. R. W. Lough; Flt. Sgt. W. J. McCallum; F/O. D. McK. MacIntosh; Flt. Lt. R. M. McKenzie; P/O. G. McLaughlin; W/O. J. A. MacLennan; W/O. J. E. McClure; Sgt. D. P. Manchul; P/O. P. D. Miles; Flt. Sgt. J. M. Miller; Flt. Sgt. L. A. Morfoot; F/O. W. R. Morrison; Flt. Sgt. D. M. Murphy; Flt. Lt. W. J. B. Murphy; F/O. J. M. Neal; F/O. E. C. Oke; F/O. M. R. O'Kelly; Flt. Sgt. F. M. Omoe; P/O. G. H. Parker; W/O. O. J. L. Pratlett; F/O. E. E. Radcliffe; F/O. R. A. Rember; Flt. Lt. A. W. Roseland; Flt. Sgt. R. A. Simpson; Flt. Sgt. G. R. Sims; W/O. R. W. Smalley; F/O. D. W. Smith; Flt. Sgt. G. E. Smith; Sgt. H. A. Smith; P/O. S. E. Smith; P/O. M. L. Strumm; P/O. V. A. Unruh; F/O. K. R. Urquhart; P/O. D. G. Wilson; P/O. C. H. Woelfle.

KILLED ON ACTIVE SERVICE.—Sgt. L. K. Beattie; Sgt. W. L. Blunt; Sgt. L. R. Carter; F/O. R. E. Johnson; Sgt. J. H. Jones; F/O. S. D. Mann; F/O. J. Michalec; Sgt. P. C. H. Mullins; P/O. F. M. Scandiffio; Sgt. G. H. Van Every; F/O. W. D. Watson; F/O. F. P. O. Weary.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Wing Cdr. A. F. Avant, D.F.C.

DIED ON ACTIVE SERVICE.—L.A/C. A. R. F. Cook; L.A/C. J. S. Holmes; L.A/C. R. H. Wilman.

Royal New Zealand Air Force

MISSING.—F/O. L. A. A. Kilgour; F/O. A. O. Rodgers.

South African Air Force

MISSING.—W/O. I. L. Cohen; Lt. F. Younglesson; Lt. J. Kerbel.

Air Transport Auxiliary

Third Officer JOHN PLATT MURPHY, A.T.A., killed whilst ferrying His Majesty's aircraft in England.

Third Officer JOSEPH FRANCIS WHEELOCK, A.T.A., killed in the course of ferry pilot duty in England.

Official Corrections

Casualty Communiqué No. 445.

Under "KILLED IN ACTION" insert Flt. Sgt. J. A. Blair and Flt. Lt. F. J. Kemp.

Under "MISSING, BELIEVED KILLED IN ACTION," delete Flt. Sgt. J. A. Blair.

Under "MISSING," delete W/O. E. B. Coleman, P/O. H. J. Douglas, Sgt. A. B. Galloway, Flt. Lt. A. Jobson, Sgt. H. Jones, Flt. Lt. F. J. Kemp, Sgt. T. G. Little, F/O. R. Murray, Sgt. J. Murray, Flt. Sgt. J. F. Neilson, F/O. B. L. Peyton, Sgt. G. E. Phillipson, F/O. A. G. Reed, Sgt. D. C. G. Spite.

Under "PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR," for Flt. Sgt. P. H. Brown read W/O. P. H. Brown.

R.A.A.F.—Under "MISSING," for Flt. Sgt. A. D. Hartley read Flt. Sgt. A. B. Hartley.

R.C.A.F.—Under "DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE," for Sgt. A. E. West read Flt. Sgt. A. E. West.

Under "MISSING," for W/O. R. A. Leach read P/O. R. A. Leach; for W/O. F. W. Logan read P/O. F. W. Logan; for Flt. Sgt. F. Vandroogenbroeck read P/O. F. Vandroogenbroeck.

S.A.A.F.—For "KILLED ON ACTIVE SERVICE." read "KILLED IN ACTION."